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THE DARWINISM OF DARWIN, AND OF THE POST-DARWINIAN SCHOOLS.¹

I PROPOSE in this article to take a brief survey of the general theory of descent, first, as this was held by Darwin himself, and next, as it is now held by the several divergent schools of thought which have arisen since Darwin's death.

The most important of the questions in debate is one which I have already had occasion to mention, while dealing, in historical order, with the objections that were brought against the theory of natural selection during the life-time of Darwin.² Here, however, we must consider it somewhat more in detail, and justify by quotation what was previously said regarding the very definite nature of his utterances upon the matter. This question is whether natural selection has been the sole, or but the main, cause of organic evolution.

Must we regard survival of the fittest as the one and only principle which has been concerned in the progressive modification of living forms, or are we to suppose that this great and leading principle has been assisted by other and subordinate principles, without the co-operation of which the results, as presented in the animal and

¹ From a forthcoming volume on *Post-Darwinian Questions*, being Part II. of *Darwin and After Darwin*, edited by Prof. C. Lloyd Morgan. Copyright in the United States by The Open Court Publishing Co.; in England, by Messrs. Longman & Co.

² *The Darwinian Theory*, pp. 253-256.

vegetable kingdoms, could not have been effected? Now Darwin's answer to this question was distinct and unequivocal. He stoutly resisted the doctrine that natural selection was to be regarded as the only cause of organic evolution. On the other hand, this opinion was—and still continues to be—persistently maintained by Mr. Wallace;¹ and it constitutes the source of all the differences between his views and those of Darwin. Moreover, up to the time of Darwin's death, Mr. Wallace was absolutely alone in maintaining this opinion: the whole body of scientific thought throughout the world being against him; for it was deemed improbable that, in the enormously complex and endlessly varied processes of organic evolution, only a single principle should be everywhere and exclusively concerned.² But since Darwin's death there has been a great revolution of biological thought in favor of Mr. Wallace's opinion. And the reason for this revolution has been, that his doctrine of natural selection as the sole cause of organic evolution has received the corroborative support of Professor Weismann's theory of heredity—which has been more or less cordially embraced by a certain section of evolutionists, and which appears to carry the doctrine in question as a logical corollary, so far, at all events, as adaptive structures are concerned.

Now in this article we shall have to do merely with a setting forth of Darwin's opinion: we are not considering how far that opinion ought to be regarded as having been in any measure displaced by the results of more recent progress. Such, then, being the only matter which here concerns us, I will supply a few brief quotations, to show how unequivocally Darwin has stated his views.

¹ "It is a misfortune attending the aim and scope of Part II. that they bring me into frequent discord with one or other of the most eminent of Post-Darwinian writers—especially with Mr. Wallace. But such is the case only because the subject-matter of this volume is avowedly restricted to debatable topics, and because I choose those naturalists who are deservedly held in most esteem to act spokesmen on behalf of such Post-Darwinian views as appear to me doubtful or erroneous. Obviously, however, differences of opinion on particular points ought not to be taken as implying any failure on my part to recognise the general scientific authority of these men, or any inability to appreciate their labors in the varied fields of Biology."—Quoted from the Preface of *Post-Darwinian Questions*.—ED.

² *Contributions to the Theory of Natural Selection*, p. 47.

First, we may take what he says upon the "Lamarckian factors";¹ and next we may consider what he says with regard to other factors, or, in general, upon natural selection not being the sole cause of organic evolution.

"Changed habits produce an inherited effect, as in the period of the flowering of plants when transported from one climate to another. With animals the increased use or disuse of parts has had a more marked influence."²

"There can be no doubt, from the facts given in this chapter, that extremely slight changes in the conditions of life sometimes, probably often, act in a definite manner on our domesticated productions; and, as the action of changed conditions in causing indefinite variability is accumulative, so it may be with their definite action. Hence considerable and definite modifications of structure probably follow from altered conditions acting during long series of generations."³

"How, again, can we explain the inherited effects of the use and disuse of particular organs? The domesticated duck flies less and walks more than the wild duck, and its limb bones have become diminished and increased in a corresponding manner in comparison with those of the wild duck. A horse is trained to certain paces, and the colt inherits similar consensual movements. The domesticated rabbit becomes tame from close confinement; the dog, intelligent from associating with man; the retriever is taught to fetch and carry; and these mental endowments and bodily powers are all inherited. Nothing in the whole circuit of physiology is more wonderful. How can the use or disuse of a particular limb or of the brain affect a small aggregate of reproductive cells, seated in a distant part of the body, in such a manner that the being developed from these cells inherits the characters of either one or both parents? . . . In the chapters devoted to inheritance, it was shown that a multitude of newly acquired characters, whether injurious or beneficial, whether of the lowest or highest vital importance, are often faithfully transmitted."⁴

"When discussing special cases, Mr. Mivart passes over the effects of the increased use and disuse of parts, which I have always maintained to be highly important, and have treated in my 'Variation under Domestication' at greater length than, as I believe, any other writer."⁵

¹ So far as we shall be concerned with them throughout this treatise, the "Lamarckian factors" consist in the supposed transmission of acquired characters, whether the latter be due to the direct influence of external conditions of life on the one hand, or to the inherited effects of use and disuse on the other. For the phrase "inherited effects of use and disuse," I shall frequently employ the term "use-inheritance," which has been coined by Mr. Platt Ball as a more convenient expression.

² *Origin of Species*, 6th Ed., p. 8.

³ *Variation etc.*, 2nd Ed., II., p. 280.

⁴ *Variation etc.*, II., p. 367.

⁵ *Origin of Species*, p. 176.

So much for the matured opinion of Darwin touching the validity of the theory of use-inheritance. Turning now to his opinion on the question whether or not there are yet any further factors concerned in the process of organic evolution, I think it will be sufficient to quote a single passage from the *Origin of Species*. The first paragraph of the "Conclusion" is devoted to a *résumé* of his views upon this matter, and consists of the following most emphatic words.

"I have now recapitulated the facts and considerations which have thoroughly convinced me that species have been modified, during a long course of descent. This has been effected chiefly through the natural selection of numerous successive, slight, favorable variations; aided in an important manner by the inherited effects of the use and disuse of parts; and in an unimportant manner, that is, in relation to adaptive structures, whether past or present, by the direct action of external conditions, and by variations which seem to us in our ignorance to arise spontaneously. It appears that I formerly underrated the frequency and value of these latter forms of variation, as leading to permanent modifications of structure independently of natural selection. But as my conclusions have lately been much misrepresented, and it has been stated that I attribute the modification of species exclusively to natural selection, I may be permitted to remark that in the first edition of this work, and subsequently, I placed in a most conspicuous position—namely, at the close of the Introduction—the following words: 'I am convinced that natural selection has been the main, but not the exclusive means of modification.' This has been of no avail. Great is the power of steady misrepresentation; but the history of science shows that fortunately this power does not long endure."

In the whole range of Darwin's writings there cannot be found a passage so strongly worded as this: it presents the only note of bitterness in all the thousands of pages which he has published. Therefore I do not think it is necessary to supply any further quotations for the purpose of proving the state of his opinion on the point in question. But, be it carefully noted, from this great or radical difference of opinion between the joint originators of the theory of natural selection, all their other differences of opinion arise; and seeing that since the death of Darwin a large number of naturalists have gone over to the side of Wallace, it seems desirable here to state categorically what these other or sequent points of difference are. Without at present discussing them, therefore, I will

merely set them out in a tabular form, in order that a clear perception may be gained of their logical connexion with this primary point of difference.

The theory of Natural Selection according to Darwin.

Natural Selection has been the main means of modification, not excepting the case of Man.

a. Therefore it is a question of evidence whether the Lamarckian factors have co-operated.

b. Neither all species, nor *a fortiori*, all specific characters, have been due to natural selection.

c. Thus the principle of Utility is not of universal application, even where species are concerned.

d. Thus, also, the suggestion as to Sexual Selection, or any other supplementary cause of modification, may be entertained; and, as in the case of the Lamarckian factors, it is a question of evidence whether, or how far, they have co-operated.

e. No detriment arises to the theory of natural selection as a theory of the origin of species by entertaining the possibility, or the probability, of supplementary factors.

f. Cross-sterility in species cannot possibly be due to natural selection.

The theory of Natural Selection according to Wallace.

Natural Selection has been the sole means of modification, excepting in the case of Man.

a. Therefore it is antecedently impossible that the Lamarckian factors can have co-operated.

b. Not only all species, but all specific characters, must necessarily have been due to natural selection.

c. Thus the principle of Utility must necessarily be of universal application, where species are concerned.

d. Thus, also, the suggestion as to Sexual Selection, or of any other supplementary cause of modification, must be ruled out; and, as in the case of the Lamarckian factors, their co-operation deemed impossible.

e. The possibility—and, *a fortiori* the probability—of any supplementary factors cannot be entertained without serious detriment to the theory of natural selection, as a theory of the origin of species.

f. Cross-sterility in species is probably due to natural selection.¹

¹This, to the best of my judgment, is the fairest extract that I can give of Mr. Wallace's most recently published opinions on the points in question. [In particular as regards *a*, see *Darwinism*, pp. 435-436.] But with regard to some of them, his expression of opinion is not always consistent. Besides, I am here taking Mr. Wallace as representative of the Neo-Darwinian school, one or other prominent member of which has given emphatic expression to each of the above propositions.

As it will be my endeavor in my forthcoming book to consider the rights and the wrongs of these antithetical propositions, I may reserve further quotations from Darwin's works, which will show that the above is a correct epitome of his views as contrasted with those of Wallace and the Neo-Darwinian school of Weismann. But here, where the object is merely a statement of Darwin's theory touching the points in which it differs from those of Wallace and Weismann, it will be sufficient to set forth these points of difference in another and somewhat fuller form. So far then as we are at present concerned, the following are the matters of doctrine which have been clearly, emphatically, repeatedly, and uniformly expressed throughout the whole range of Darwin's writings.

1. That natural selection has been the main means of modification.

2. That, nevertheless, it has not been the only means ; but has been supplemented or assisted by the co-operation of other causes.

3. That the most "important" of these other causes has been the inheritance of functionally-produced modifications (use-inheritance), but this only because the transmission of such modifications to progeny must always have had immediate reference to *adaptive* ends, as distinguished from merely useless change.

4. That there are sundry other causes which lead to merely useless change—in particular, "the direct action of external conditions, and variations which seem to us in our ignorance to arise spontaneously."

5. Hence, that the "principle of utility," far from being of universal occurrence in the sphere of animate nature, is only of what may be termed highly general occurrence ; and, therefore, that certain other advocates of the theory of natural selection were mistaken in representing the universality of this principle as following by way of necessary consequence from that theory.

6. Cross-sterility in species cannot possibly be due to natural selection : but everywhere arises as a result of some physiological change having exclusive reference to the sexual system—a change which is probably everywhere due to the same cause, although what this cause could be Darwin was confessedly unable to suggest.

Such, then, was the theory of evolution as held by Darwin, so far as the points at present before us are concerned. And, it may now be added, that the longer he lived, and the more he pondered these points, the less exclusive was the rôle which he assigned to natural selection, and the more importance did he attribute to the supplementary factors above named. This admits of being easily demonstrated by comparing successive editions of his works; a method adopted by Mr. Herbert Spencer in his essay on the *Factors of Organic Evolution*.

My object in thus clearly defining Darwin's attitude regarding these sundry points is twofold.

In the first place, with regard to merely historical accuracy, it appears to me undesirable that naturalists should endeavor to hide certain parts of Darwin's teaching, and give undue prominence to others. In the second place, it appears to me still more undesirable that this should be done—as it usually is done—for the purpose of making it appear that Darwin's teaching did not really differ very much from that of Wallace and Weismann on the important points in question. I myself believe that Darwin's judgment with regard to all these points will eventually prove more sound and accurate than that of any of the recent would-be improvers upon his system; but even apart from this opinion of my own, it is undesirable that Darwin's views should be misrepresented, whether the misrepresentation be due to any unfavorable bias against one side of his teaching, or to sheer carelessness in the reading of his books. Yet the new school of evolutionists, to which allusion has now so frequently been made, speak of their own modifications of Darwin's teaching as "pure Darwinism," in contradistinction to what they call "Lamarckism." In other words, they represent the principles of "Darwinism" as standing in some kind of opposition to those of "Lamarckism": the Darwinian principle of natural selection, they think, is in itself enough to account for all the facts of adaptation in organic nature. Therefore they are eager to dispense with the Lamarckian principle of the inherited effects of use and disuse, together with the direct influence of external conditions of life, and all or any other causes of modification which either have been, or in

the future may possibly be, suggested. Now, of course, there is no reason why any one should not hold these or any other opinions to which his own independent study of natural science may lead him ; but it appears to me that there is the very strongest reason why any one who deviates from the carefully formed opinions of such a man as Darwin should above all things be careful to be absolutely fair in his representations of them ; he should be scrupulously jealous, so to speak, of not letting it appear that he is unjustifiably throwing over his own opinions the authority of Darwin's name.

But in the present case, as we have seen, not only do the Neo-Darwinians strain the teachings of Darwin ; they positively reverse those teachings—representing as anti-Darwinian the whole of one side of Darwin's system, and calling those who continue to accept that system in its entirety by the name "Lamarckians." I know it is sometimes said by members of this school, that in his utilisation of Lamarckian principles as accessory to his own, Darwin was actuated by motives of "generosity." But a more preposterous suggestion could not well be made. We may fearlessly challenge any one who speaks or writes in such a way, to show any other instance where Darwin's great generosity of disposition had the effect of influencing by one hair's breadth his still greater loyalty to truth. Moreover, and with special regard to this particular case, I would point out that in no one of his many allusions to, and often lengthy discussions of, these so-called Lamarckian principles, does he ever once introduce the name of Lamarck ; while, on the other hand, in the only places where he does so—whether in his books or in his now published letters—he does so in order to express an almost contemptuous dissatisfaction, and a total absence of obligation. Hence, having regard to the "generosity" with which he always acknowledged obligations, there can be no reasonable doubt that Darwin was not in the smallest degree influenced by the speculative writings of Lamarck ; or that, even if Lamarck had never lived, the *Origin of Species* would have differed in any single particular from the form in which it now stands. Finally, it must not be forgotten that Darwin's acceptance of the theory of use-inheritance was vitally essential to his theory of Pangenesis—that "beloved child" over which

he had "thought so much as to have lost all power of judging it."¹

What has just been said touching the relations between Darwin's theory and that of Lamarck, applies with equal force to the relations between Darwin's theory and any other theory appertaining to evolution which has already been, or may hereafter be propounded. Yet so greatly have some of the Neo-Darwinians misunderstood the teachings of Darwin, that they represent as "Darwinian heresy" any suggestions in the way of factors "supplementary to," or "co-operative with" natural selection. Of course, if these naturalists were to avow themselves followers of Wallace, instead of followers of Darwin, they would be perfectly justified in repudiating any such suggestions as *ipso facto* heretical. But, as we have now seen, through all his life Darwin differed from Wallace with regard to this very point; and therefore, unlike Wallace, he was always ready to entertain "additional suggestions" regarding the causes of organic evolution—several of which, indeed, he himself supplied. Hence we arrive at this curious state of matters. Those biologists who of late years have been led by Weismann to adopt the opinions of Wallace, represent as anti-Darwinian the opinions of other biologists who still adhere to the unadulterated doctrines of Darwin. Weismann's *Essays on Heredity* (which argue that natural selection is the only possible cause of adaptive modification) and Wallace's work on *Darwinism* (which in all the respects where any charge of "heresy" is concerned directly contradicts the doctrine of Darwin)—these are the writings which are now habitually represented by the Neo-Darwinians as setting forth the views of Darwin in their "pure" form. The result is that, both in conversation and in the press, we habitually meet with complete inversions of the truth, which show the state of confusion into which a very simple matter has been wrought by the eagerness of certain naturalists to identify the views of Darwin with those of Wallace and Weismann. But we may easily escape this confusion, if we remember that wherever in the writings of these naturalists there occur such phrases as "pure

¹ *Life and Letters*, Vol. III., pp. 72 and 75.

Darwinism" we are to understand pure *Wallaceism*, or the pure theory of natural selection to the exclusion of any supplementary theory. Therefore it is that for the sake of clearness I coined, several years ago, the terms "Neo-Darwinian" and "Ultra-Darwinian" whereby to designate the school in question.

So much, then, for the Darwinism of Darwin, as contrasted with the Darwinism of Wallace, or, what is the same thing, of the Neo-Darwinian school of Weismann. Next we may turn, by way of antithesis, to the so-called "Neo-Lamarckian" school of the United States. For, by a curious irony of fate while the Neo-Darwinian school is in Europe seeking to out-Darwin Darwin by assigning an exclusive prerogative to natural selection in both kingdoms of animate nature, the Neo-Lamarckian school is in America endeavoring to reform Darwinism in precisely the opposite direction—viz. by transferring the sovereignty from natural selection to the principles of Lamarck. Without denying to natural selection a more or less important part in the process of organic evolution, members of this school believe that much greater importance ought to be assigned to the inherited effects of use and disuse than was assigned to these agencies by Darwin. Perhaps this noteworthy state of affairs, within a decade of Darwin's death, may lead us to anticipate that his judgment—standing, as it does, between these two extremes—will eventually prove the most accurate of all, with respect to the relative importance of these factors of evolution. But, be this as it may, I must now offer a few remarks upon the present position of the matter.

In the first place, to any one who (with Darwin and against Weismann) admits not only the abstract possibility, but an actual working, of the Lamarckian factors, it becomes difficult to determine, even approximately, the degrees of value which ought to be ascribed to them and to natural selection respectively. For, since the results are in both cases identical in kind (as, adaptive changes of organic types), where both sets of causes are supposed to be in operation together, we have no means of estimating the relative shares which they have had in bringing about these results. Of course there are large numbers of cases where it cannot possibly be

supposed that the Lamarckian factors have taken any part at all in producing the observed effects; and therefore in such cases there is almost full agreement among evolutionists in theoretically ascribing such effects to the exclusive agency of natural selection. Of such, for instance, are the facts of protective coloring, of mimicry, of the growth of parts which, although *useful*, are never *active* (e. g. shells of mollusks, hard coverings of seeds), and so on. But in the majority of cases where adaptive structures are concerned, there is no means of discriminating between the influences of the Lamarckian and the Darwinian factors. Consequently, if by the Neo-Lamarckian school we understand all those naturalists who assign any higher importance to the Lamarckian factors than was assigned to them by Darwin, we may observe that members of this school differ very greatly among themselves as to the degree of importance that ought to be assigned. On the one hand we have, in Europe, Giard, Perrier, and Eimer, who stand nearer to Darwin than do a number of the American representatives—of whom the most prominent are Cope, Osborn, Packard, Hyatt, Brooks, Ryder, and Dall. The most extreme of these is Professor Cope, whose collection of essays entitled *The Origin of the Fittest*, as well as his more recent and elaborate monograph on *The Development of the Hard Parts of the Mammalia* represent what appears even to some other members of his school an extravagant estimate of the importance of Lamarckian principles.

But the most novel, and in many respects the most remarkable school of what may be termed Anti-selectionists is one which is now (1894) rapidly increasing both in numbers and in weight, not only in the New World, but also in Germany, and to a lesser extent, in Great Britain.

This school, without being either Lamarckian or Darwinian (for its individual members differ widely from one another in these respects) maintains a principle which it deems of more importance than either use-inheritance or natural selection. This principle it calls Self-adaptation. It is chiefly botanists who constitute this school, and its principal representatives, in regard to authority, are Sachs, Pfeffer and Henslow.

Apart from topics which are to be dealt with in my book, the only matters of much importance which have been raised in the Post-Darwinian period are those presented by the theories of Geddes, Cope, Hyatt, and others, and certain more or less novel ideas set forth in Wallace's *Darwinism*.

Mr. Geddes has propounded a new theory of the origin of species, which in his judgment supersedes to a large extent the theory of natural selection. He has also, in conjunction with Mr. Thomson, propounded a theory of the origin of sex. For my own part, I cannot see that these views embody any principles or suggestions of a sufficiently definite kind to constitute them theories at all. In this respect the views of Mr. Geddes resemble those of Professors Cope, Hyatt, and others, on what they term "the law of acceleration and retardation." In all these cases, so far as I can see, the so-called explanations are not in fact any explanations; but either are a mere re-statement of the facts, or else an enunciation of more or less meaningless propositions. Thus, when it is said that the evolution of any given type has been due to the "acceleration of growth-force" with respect to some structures, and the "retardation of growth-force" with respect to others, it appears evident that we have not any real explanation in terms of causality; we have only the form of an explanation in the terms of a proposition. All that has been done is to express the fact of evolution in somewhat obscure phraseology, since the very thing we want to know about this fact is—What are the causes of it as a fact or the reasons which have led to the increase of some of the parts of any given type and the concomitant decrease of others? It is merely the facts themselves that are again presented by saying that the development has been in the one case accelerated, while in the other it has been retarded.¹

¹Take, for example, the following which is a fair epitome of the whole:—"I believe that this is the simplest mode of stating and explaining the law of variation; that some forms acquire something which their parents did not possess; and that those which acquire something additional have to pass through more numerous stages than their ancestors; and those which lose something pass through fewer stages than their ancestors; and these processes are expressed by the terms "acceleration" and "retardation." (*Origin of the Fittest*, pp. 125, 226, and 297.) Even

So much for what may be termed this New World theory of the origin of species: it is a mere re-statement of the facts. Mr. Geddes's theory, on the other hand, although more than a mere re-statement of the facts, appears to me too vague to be of any explanatory service. His view is that organic evolution has everywhere depended upon an antagonism, within the limits of the same organism, between the processes of nutrition and those of reproduction. But although he is thus able hypothetically to explain certain facts—such as the shortening of a flower-spike into a composite flower—the suggestion is obviously inadequate to meet, even hypothetically, most of the facts of organic evolution, and especially the development of *adaptive* structures. Therefore it seems to me, we may dismiss it even as regards the comparatively few facts which it might conceivably explain—seeing that these same facts may be equally well explained by the causes which are already known to operate in other cases. For it is the business of natural selection to ensure that there shall nowhere be any needless expenditure of vital energy, and, consequently, that everywhere the balance between nutrition and reproduction shall be most profitably adjusted.

Similarly with respect to the theory of the *Origin of Sex*, I am unable to perceive even this much of scientific relevancy. As stated by its authors, the theory is that the female is everywhere “anabolic,” as compared with the male, which is “katabolic.” By anabolic is meant comparative inactivity of protoplasmic change due to a nutritive winding up of molecular constitution, while by katabolic is meant the opposite condition of comparative activity due to a dynamic running down of molecular constitution. How, then, can the *origin* of sex be explained, or the *causes* which led to the differentiation of the sexes be shown, by saying that the one sex is anabolic and the other katabolic? In so far as these verbal statements serve to express what is said to be a general fact—namely, that the female sexual elements are less mobile than the male—they merely serve to re-state this general fact in terminology which, as

if this be “the simplest mode of *stating* the law of variation,” it obviously does nothing in the way of *exp'aining* the law.

the authors themselves observe, is "unquestionably ugly." But in so far as any question of *origin* or *causality* is concerned, it appears to me that there is absolutely no meaning in such statements. They belong to the order of merely formal explanations, as when it is said that the toxic qualities of morphia are due to this drug possessing a soporific character.

Much the same, in my opinion, has to be said of the Rev. G. Henslow's theory of the origin of species by what he terms "self-adaptation." Stated briefly, his view is that there is no sufficient evidence of natural selection as a *vera causa*, while there is very abundant evidence of adjustments occurring without it, first in individual organisms, and next by inheritance of acquired characters, in species. Now, much that he says in criticism of the selection theory is of considerable interest as such; but when we pass from the critical to the constructive portions of his books and papers, we again meet with the want of clearness in thought between a statement of facts in terms of a proposition, and an explanation of them in those of causality. Indeed, I understand from private correspondence, that Mr. Henslow himself admits the validity of this criticism; for in answer to my questions,—“How does self-adaptation work in each case, and why should protoplasm be able to *adapt itself* into the millions of diverse mechanisms in nature?”—he writes, “Self-adaptation does not profess to be a *vera causa* at all; for the true causes of variation can only be found in the answer to your [above] questions, and I must say at once, *these questions cannot be answered.*” That is, they cannot be answered on the hypothesis of self-adaptation, which is therefore a statement of the facts of adaptation as distinguished from an explanation of them. Nevertheless, two things have here to be noted. In the first place, the statement of facts which Mr. Henslow has collected is of considerable theoretical importance as tending to show that there are probably causes of an internal kind (i. e., other than natural selection) which have been largely concerned in the adaptive modification of plants. And, in the second place, it is not quite true that the theory of self-adaptation is, as its author says in the sentences above quoted, a mere statement of the facts of adaptation, without any

attempt at explaining their causes. For in his published words he does attempt to do so.¹ And, although I think his attempt is a conspicuous failure, I ought in fairness to give examples of it. His books are almost exclusively concerned in an application of his theory to the mechanisms of flowers for securing their own fertilisation. These mechanisms he ascribes, in the case of entomophylous flowers, to the "thrusts," "strains," and other "irritations" supplied to the flowers by their insect visitors, and consequent "reactions" of the vegetable "protoplasm." But no attempt is made to show why these "reactions" should be of an *adaptive* kind, so as to build up the millions of diverse and often elaborate mechanisms in question—including not only forms and movements, but also colors, odors, and secretions. For my own part I confess that, even granting to an ultra-Lamarckian extent the inheritance of acquired characters, I should conceive of "self-adaptation" alone producing all such innumerable and diversified adjustments only after seeing, with Cardinal Newman, an angel in every flower. Yet Mr. Henslow somewhat vehemently repudiates any association between his theory and that of teleology.

On the whole, then, I regard all the works which are here classed together (those by Cope, Geddes, and Henslow) as resembling one another both in their merits and defects. Their common merits lie in their erudition and much of their criticism, while their common defects consist on the one hand in not sufficiently distinguishing between mere statements and real explanations of facts, and, on the other, in not perceiving that the theories severally suggested as substitutes for that of natural selection, even if they be granted true, could be accepted only as co-operative factors, and by no stretch of logic as substitutes.

Turning now to Mr. Wallace's work on *Darwinism*, we have to notice, in the first place, that its doctrine differs from "Darwinism" in regard to the important dogma which it is the leading purpose of that work to sustain—namely, that "the law of utility" is, to all in-

¹ *Floral Structures* (International Science Series, LXIV., 1888); *The Making of Flowers* (Romance of Science Series, 1891); and Linn. Soc. Papers, 1893-1894.

tents and purposes, universal, with the result that natural selection is virtually the only cause of organic evolution. I say, "to all intents and purposes" or "virtually," because Mr. Wallace does not expressly maintain the abstract impossibility of laws and causes other than those of utility and natural selection; indeed, at the end of his treatise he quotes with approval Darwin's judgment, that "natural selection has been the most important, but not the exclusive means of modification." Nevertheless, as he nowhere recognises any other law or cause of adaptive evolution,¹ he practically concludes that, on inductive or empirical grounds, there *is* no such other law or cause to be entertained—until we come to the particular case of the human mind. But even in making this one particular exception—or in representing that some other law than that of utility, and some other cause than that of natural selection, must have been concerned in evolving the mind of man—he is not approximating his system to that of Darwin. On the contrary, he is but increasing the divergence, for, of course, it was Darwin's view that no such exception could be legitimately drawn with respect to this particular instance. And if, as I understand must be the case, his expressed agreement with Darwin touching natural selection not being the only cause of adaptive evolution has reference to this point, the quotation is singularly inapt.

Looking, then, to these serious differences between his own doctrine of evolution—both organic and mental—and that of Darwin, I cannot think that Mr. Wallace has chosen a suitable title for his book; because, in view of the points just mentioned, it is unquestionable that *Darwinism* differs more widely from the *Origin of Species* than does the *Origin of Species* from the writings of the Neo-Lamarckians. But, passing over this merely nominal matter, a few words ought to be added on the very material question regarding the human mind. In my book the more general question, or that which relates to the range of utility and natural selection elsewhere will be fully considered.

¹ "The law of correlation," and the "laws of growth," he does recognise; and shows that they furnish an explanation of the origin of many characters, which cannot be brought under "the law of utility."

Mr. Wallace says :

"The immense interest that attaches to the origin of the human race, and the amount of misconception which prevails regarding the essential teachings of Darwin's theory on the question, as well as regarding my own special views upon it, induce me to devote a final chapter to its discussion."

Now I am not aware that there is any misconception in any quarter as to the essential teachings of Darwin's theory on this question. Surely it is rather the case that there is a very general and very complete understanding on this point, both by the friends and the foes of Darwin's theory—so much so, indeed, that it is about the only point of similar import in all Darwin's writings of which this can be said. Mr. Wallace's "special views" on the other hand are, briefly stated, that certain features, both of the morphology and the psychology of man, are inexplicable by natural selection—or indeed by any other cause of the kind ordinarily understood by the term natural: they can be explained only by supposing "the intervention of some distinct individual intelligence," which, however, need not necessarily be "one Supreme Intelligence," but some other order of Personality standing anywhere in "an infinite chasm between man and the Great Mind of the universe."¹ Let us consider separately the corporeal and the mental peculiarities which are given as justifying this important conclusion.

The bodily peculiarities are the feet, the hands, the brain, the voice, and the naked skin.

As regards the feet Mr. Wallace writes, "It is difficult to see why the prehensile power [of the great toe] should have been taken away," because, although "it may not be compatible with perfectly easy erect locomotion," "how can we conceive that early man, *as an animal*, gained anything by purely erect locomotion?"² But surely it is not difficult to conceive this. In the proportion that our simian progenitors ceased to be arboreal in their habits (and there may well have been very good utilitarian reasons for such a change of habitat, analogous to those which are known to have occurred in the phylogenesis of countless other animals), it would clearly have

¹ *Natural Selection and Tropical Nature*, 1891, p. 205.

² *Ibid.*, pp. 197 198.

been of advantage to them that their already semi-erect attitude should have been rendered more and more erect. To name one among several probabilities, the more erect the attitude, and the more habitually it was assumed, the more would the hands have been liberated for all the important purposes of manipulation. The principle of the physiological division of labor would thus have come more and more into play: natural selection would therefore have rendered the upper extremities more and more suited to the execution of these purposes, while at the same time it would have more and more adapted the lower ones to discharging the sole function of locomotion. For my own part, I cannot perceive any difficulty about this: in fact, there is an admirable repetition of the process in the ontogeny of our own children.¹

Next, with regard to the hand, Mr. Wallace says, that it "contains latent capacities which are unused by savages and must have been even less used by palæolithic man and his still ruder predecessors." Thus, "it has all the appearance of an organ prepared for the use of civilised man."² Even if this be true, however, it would surely be a dangerous argument to rely upon, seeing that we cannot say of how much importance it may have been for early man—or even apes—to have had their power of manipulation progressively improved. But is the statement true? It appears to me that if Mr. Wallace had endeavored to imitate the manufactures that were practised by "palæolithic man," he would have found the very best of reasons for cancelling his statement. For it is an extremely difficult thing to chip a flint into the form of an arrow-head: when made, the suitable attachment of it to a previously prepared arrow is no easy matter: neither a bow nor a bow-string could have been constructed by hands of much less perfection than our own: and the slaying of game with the whole apparatus, when it has been constructed, requires a manual dexterity which we may be perfectly

¹ For an excellent discussion on the ontogeny of the child in this connexion see *Some Laws of Heredity*, by Mr. S. S. Buckman, pp. 290, et seq. (*Proc. Cotteswood Nat. Field Club*, Vol. X., p. 3, 1892).

² *Loc. cit.*, p. 198.

certain that Mr. Wallace—unless he has practised the art from boyhood—does not possess.

So it is with his similar argument that the human voice is more “powerful,” more “flexible,” and presents a greater “range” and “sweetness” than the needs of savage life can be held to require. The futility of this argument is self-evident as regards “power.” And although its weakness is not so obvious with respect to the other three qualities which are named, need we go further than the closely analogous case of certain birds to show the precariousness of arguing from such facts of organic nature to the special operation of “a superior intelligence”? I can hardly suppose that Mr. Wallace will invoke any such agency for the purpose of explaining the “latent capacities” of the voice of a parrot. Yet, in many respects, these are even more wonderful than those of the human voice, albeit in a wild state they are “never required or used.”¹

Once more, with regard to the naked skin, it seems sufficient to quote the following passage from the first edition of the *Descent of Man*:

“The Rev. T. R. Stebbing, in commenting on this view, remarks, that had Mr. Wallace ‘employed his usual ingenuity on the question of man’s hairless skin, he might have seen the possibility of its selection through its superior beauty, or the health attaching to superior cleanliness. At any rate it is surprising that he should picture to himself a superior intelligence plucking the hair from the backs of savage men (to whom, according to his own account, it would have been useful and beneficial), in order that the descendants of the poor shorn wretches might, after many deaths from cold and damp in the course of many generations,’ have been forced to raise themselves in the scale of civilisation through the practice of various arts, in the manner indicated by Mr. Wallace.”²

To this it may be added that the chimpanzee “Sally” was largely denuded of hair, especially on the back, or the part of

¹ For a discussion of this remarkable case, see *Mental Evolution in Animals*, pp. 222–223. It appears to me that if Mr. Wallace’s argument from the “latent capacities of the voice of Man” is good for anything, *a fortiori* it must be taken to prove that, in the case of the parrot, “the organ has been prepared in anticipation” of the amusement which the cultivation of its latent capacities arouses in “civilised man.”

² *Descent of Man*, 1st Ed., Ch. XX. (Trans. Dev. Assoc. for Science, 1890).

"man's organisation" on which Mr. Wallace lays special stress, as being in this respect out of analogy with other mammalia.¹

Lastly, touching his statement that the brain of savage man is both quantitatively and qualitatively in advance of his requirements, it is here also sufficient to refer to Darwin's answer, as given in the *Descent of Man*. Mr. Wallace, indeed, ignores this answer in his recent re-publication of the argument; but it is impossible to understand why he should have done so. To me, at all events, it seems that one out of several considerations which Darwin advances is alone sufficient to show the futility of this argument. I allude to the consideration that the power of forming abstract ideas with the complex machinery of language as the vehicle of their expression, is probably of itself enough to account for both the mass and the structure of a savage's brain. But this leads us to the second division of Mr. Wallace's argument, or that derived from the mental endowments of mankind.

Here the peculiarities called into evidence are, "the Mathematical Faculty," "the Artistic Faculties," and "the Moral Sense." With regard to the latter, he avows himself a member of the intuitional school of ethics; but does not prove a very powerful advocate as against the utilitarian.²

¹ The late Professor Mosely informed me that, during his voyage on the *Challenger*, he had seen many men whose backs were well covered with hair.—For an excellent discussion of the whole question, chiefly in the light of embryology, see the paper by Buckman already alluded to, pp. 280–289. Also, for an account of an extraordinary hairy race of men, see *Alone with the Hairy Ainu*, by A. H. Savage Landor, 1893.

² E. g. "The special faculties we have been discussing clearly point to the existence in man of something which he has not derived from his animal progenitors—something which we may best refer to as being of a spiritual essence or nature, capable of progressive development under favorable conditions. On the hypothesis of this spiritual nature, superadded to the animal nature of man, we are able to understand much that is otherwise mysterious or unintelligible in regard to him, especially the enormous influence of ideas, principles, and beliefs over his whole life and action. Thus alone can we understand the constancy of the martyr, the unselfishness of the philanthropist, the devotion of the patriot, the enthusiasm of the artist, and the resolute and persevering search of the scientific worker after nature's secrets. Thus we may perceive that the love of truth, the delight in beauty, the passion for justice, and the thrill of exultation with which we hear of any act of courageous self-sacrifice, are the workings within us of a higher nature

It comes, then, to this. According to Mr. Wallace's eventual conclusion, man is to be separated from the rest of organic nature, and the steady progress of evolution by natural causes is to be regarded as stopped at its final stage, because the human mind presents the faculties of mathematical calculation and æsthetic perception. Surely, on antecedent grounds alone, it must be apparent that there is here no kind of proportion between the conclusion and the *data* from which it is drawn. That we are not confined to any such grounds, I will now try to show.

Let it be remembered, however, that in the following brief criticism I am not concerned with the issue as to whether, or how far, the "faculties" in question have owed their origin or their development to *natural selection*. I am concerned only with the doctrine that in order to account for such and such particular "faculty" of the human mind, some order of causation must be supposed other than what we call natural. I am not a Neo-Darwinist, and so have no desire to make "natural selection" synonymous with "natural causation" throughout the whole domain of life and of mind. And I quite agree with Mr. Wallace that, at any rate, the "æsthetic faculty" cannot conceivably have been produced by natural selection—seeing that it is of no conceivable life-serving value in any of the stages of its growth. Moreover, it appears to me that the same thing has to be said of the play instincts, sense of the ludicrous, and sundry other "faculties" of mind among the lower animals. It being thus understood that I am not differing from Mr. Wallace where

which has not been developed by means of the struggle for material existence." (*Darwinism*, p. 474.) I have quoted this whole paragraph, because it is so inconsistent with the rest of Mr. Wallace's system that a mere epitome of it might well have been suspected of error. Given an intellectual being, howsoever produced, and what is there "mysterious or unintelligible" in "the enormous influence of ideas, principles, and beliefs over his whole life and action"? Or again, if he be also a social being, what is the relevancy of adducing "the constancy of the martyr," "the unselfishness of the philanthropist," "the devotion of the patriot," "the love of truth," "the passion for justice," "the thrill of exultation when we hear of any act of courageous self-sacrifice," in evidence *against* the law of *utility*, or in order to prove that a "nature" thus endowed has "*not* been developed by means of the struggle for existence," when once this struggle has been transferred from individuals to communities? The whole passage reads like an ironical satire in favor of "Darwinism," rather than a serious argument against it.

he imposes "limits" on the powers of natural selection, but only where he seems to take for granted that this is the same thing as imposing limits on the powers of natural causation, my criticism is as follows.

In the first place, it is a psychological fallacy to regard the so-called "faculties" of mind as analogous to "organs" of the body. To classify the latter with reference to the functions which they severally perform is to follow a natural method of classification. But it is an artificial method which seeks to partition mental *faculty* into this, that, and the other mental *faculties*. Like all other purely artificial classifications, this one has its practical uses; but, also like them, it is destitute of philosophical meaning. This statement is so well recognised by psychologists that there is no occasion to justify it. But I must remark that any cogency which Mr. Wallace's argument may appear to present, arises from his not having recognised the fact which the statement conveys. For, had he considered the mind as a whole, instead of having contemplated it under the artificial categories of constituent "faculties," he would probably not have laid any such special stress upon some of the latter. In other words, he would have seen that the general development of the human mind as a whole has presumably involved the growth of those conventionally abstracted parts, which he regards as really separate endowments. Or, if he should find it easier to retain the terms of his metaphor, we may answer him by saying that the "faculties" of mind are "correlated," like "organs" of the body; and, therefore, that any general development of the various other "faculties" have presumably entailed a collateral development of the two in question.

Again, in the second place, it would seem that Mr. Wallace has not sufficiently considered the co-operation of other well-known natural causes, which must have materially assisted the survival of the fittest where these two "faculties" are concerned. For, even if we disregard the inherited effects of use—which, however, if entertained as possible in any degree at all, must have here constituted an important factor,—there remain, on the one hand, the

unquestionable influences of individual education, and, on the other hand, of the selection principle operating in the mind itself.

Taking these two points separately, it is surely sufficiently well known that individual education—or special training, whether of mind or body—usually raises congenital powers of any kind to a more or less considerable level above those of the normal type. In other words, whatever doubt there may be touching the *inherited* effects of use, there can be no question touching the immense *developmental* effects thereof in the individual life-time. Now, the conditions of savage life are not such as lead to any deliberate cultivation of the “faculties,” either of the mathematical or æsthetic order. Consequently, as might be expected, we find both of them in what Mr. Wallace regards as but a “latent” stage of development. But in just the same way do we find that the marvellous powers of an acrobat when specially trained from childhood—say to curve his spine backwards until his teeth can bite his heels—are “latent” in all men. Or, more correctly, they are *potential in every child*. So it is with the prodigious muscular development of a trained athlete, and with any number of other cases where either the body or the mind is concerned. Why, then, should Mr. Wallace select the particular instances of the mathematical and æsthetic powers in savages as in any special sense “prophetic” of future development in trained members of civilised races? Although it is true that these “latent capacities and powers are unused by savages,” is it not equally true that savages fail to use their latent capacities and powers as tumblers and athletes? Moreover, is it not likewise true that *as* used by savages, or as occurring normally in man, such capacities and powers are no less poorly developed than are those of the “faculties” on which Mr. Wallace lays so much stress? In other words, are not “latent capacities and powers” of all kinds more or less equally in excess of anything that is ever required of them by man in a state of nature? Therefore, if we say that where mathematics and the fine arts are concerned the potential capacities of savage man are in some mystical sense “prophetic” of a Newton or a Beethoven, so in consistency ought we to say that in these same capacities

we discern a similar prophecy of those other uses of civilised life which we have in a rope-dancer or a clown.

Again, and in addition to this, it should be remembered that, even if we do suppose any prophecy of this kind where the particular capacities in question are concerned, we must clearly extend the reference to the lower animals. Not a few birds display æsthetic feelings in a measure fairly comparable with those of savages; while we know that some animals present the germs of a "faculty" of computation.¹ But it is needless to add, this fact is fatal to Mr. Wallace's argument as I understand it—viz., that the "faculties" in question have been in some special manner communicated by some superior intelligence to *man*.

Once more, it is obviously unfair to select such men as a "Newton, a La Place, a Gauss, or a Cayley" for the purpose of estimating the difference between savages and civilised man in regard to the latter "faculty." These men are the picked mathematicians of centuries. Therefore, they are men who not only enjoyed all the highest possible benefits of individual culture, but likewise those who have been most endowed with mathematical power congenitally. So to speak, they are the best variations in this particular direction which our race is known to have produced. But had such variations arisen among savages, it is sufficiently obvious that they could have come to nothing. Therefore, it is the *normal average* of "mathematical faculty" in civilised man that should be contrasted with that of savage man; and, when due regard is paid to the all-important consideration which immediately follows, I cannot feel that the contrast presents any difficulty to the theory of human evolution by natural causation.

Lastly, the consideration just alluded to is, that civilised man enjoys an advantage over savage man far in advance even of those

¹ See *Proceedings Zoölogical Society*, June 4, 1889, for an account of the performances in this respect of the chimpanzee "Sally." Also, for some remarks on the psychology of the subject, in *Mental Evolution in Man*, p. 215. I should like to take this opportunity of stating that, after the two publications above referred to, this animal's instruction was continued, and that, before her death, her "counting" extended as far as ten. That is to say, any number of straws asked for from one to ten would always be correctly given.

which arise from a settled state of society, incentives to intellectual training, and so on. This inestimable advantage consists in the art of writing, and the consequent transmission of the effects of culture from generation to generation. Quite apart from any question as to the hereditary transmission of acquired characters, we have in this *intellectual* transmission of acquired *experience* a means of accumulative cultivation quite beyond our powers to estimate. For, unlike all other cases where we recognise the great influence of individual use or practice in augmenting congenital "faculties" (such as in the athlete, pianist, etc.), in this case the effects of special cultivation do not end with the individual life, but are carried on and on through successive generations *ad infinitum*. Hence, a civilised man inherits mentally, if not physically, the effects of culture for ages past, and this in whatever direction he may choose to profit therefrom. Moreover—and I deem this an immensely important addition—in this unique department of purely intellectual transmission, a kind of non-physical natural selection is perpetually engaged in producing the best results. For here a struggle for existence is constantly taking place among "ideas," "methods," and so forth, in what may be termed a psychological environment. The less fit are superseded by the more fit, and this not only in the mind of the individual, but, through language and literature, still more in the mind of the race. "A Newton, a La Place, a Gauss, or a Cayley," would all alike have been impossible, but for a previously prolonged course of mental evolution due to the selection principle operating in the region of mathematics, by means of continuous survivals of the best products in successive generations. And, of course, the same remark applies to art in all its branches.¹

Quitting then the last, and in my opinion the weakest chapter of *Darwinism*, the most important points presented by other portions of this work are—to quote its author's own enumeration of

¹ In Prof. Lloyd Morgan's *Animal Life and Intelligence* there is an admirable discussion on this subject, which has been published since the above was written. The same has to be said of Weismann's essay on music, where much that I have here said is anticipated. With the views and arguments which Mr. Mivart has forcibly set forth I have already dealt to the best of my ability in a work on *Mental Evolution in Man*.

them—an attempted “proof that all specific characters are (or once have been) either useful in themselves or correlated with useful characters”: an attempted “proof that natural selection can, in certain cases, increase the sterility of crosses”: an attempted “proof that the effects of use and disuse even if inherited, must be overpowered by natural selection”: an attempted proof that the facts of variation in nature are in themselves sufficient to meet the difficulty which arises against the theory of natural selection, as held by him, from the swamping effects of free inter-crossing: and lastly, “a fuller discussion on the color relations of animals, with additional facts and arguments on the origin of sexual differences of color.” It will be sufficient here to remark, that in as far as I disagree with Mr. Wallace (and agree with Darwin), on the subject of “sexual differences of color,” my reasons for doing so have been already sufficiently stated in Part I. of *Darwin and After Darwin*. But there is much else in his treatment of this subject which appears to me highly valuable, and therefore presenting an admirable contribution to the literature of Darwinism. In particular, it appears to me that the most important of his views in this connexion probably represents the truth—namely, that, among the higher animals, more or less conspicuous peculiarities of color have often been acquired for the purpose of enabling members of the same species quickly and certainly to recognise one another. This theory was first published by Mr. J. E. Todd, in 1888, and therefore but a short time before its re-publication by Mr. Wallace. As his part in the matter has not been sufficiently recognised, I should like to conclude this article by drawing prominent attention to the merits of Mr. Todd’s paper. For not only has it the merit of priority, but it deals with the whole subject of “recognition colors”—or, as he calls them, “directive colors”—in a more comprehensive manner than has been done by any of his successors. In particular, he shows that the principle of recognition-marking is not restricted to facilitating sexual intercourse, but extends also to several other matters of importance in the economy of animal life.¹

¹ *American Naturalist*, XXII., pp. 201–207.

Having thus briefly sketched the doctrines of the sundry Post-Darwinian Schools from a general point of view, I shall endeavor in Part II. of *Darwin and After Darwin* to discuss in appropriate detail the questions which have more specially come to the front in the Post-Darwinian period. It can scarcely be said that any one of these questions has arisen altogether *de novo* during this period; for glimmerings, more or less conspicuous, of all are to be met with in the writings of Darwin himself. Nevertheless it is no less true that only after his death have they been lighted up to the full blaze of active discussion.¹ The most important of them are four in number, and it is noteworthy that they are all intimately connected with the great question which Darwin spent the best years of his life in contemplating, and which has therefore, in one form or another, occupied the whole of this article—the question as to whether natural selection has been the sole cause, or but the chief cause of modification.

The four questions above alluded to appertain respectively to heredity, utility, isolation, and physiological selection. Of these the first two will form the subject-matter of my forthcoming volume, while the last two will be dealt with in the final instalment of *Darwin, and After Darwin*.

G. J. ROMANES.

¹ It is almost needless to say that besides the works mentioned in this article, many others have been added to the literature of Darwinism since Darwin's death. But as none of these profess to contain much that is original, I have not thought it necessary to consider any of them in this merely general review of the period in question.

[Since this note was written and printed the following works have been published to which it does not apply: *Animal Life and Intelligence*, by Prof. Lloyd Morgan; *The Colours of Animals*, by Professor Poulton; *Materials for the Study of Variation*, by Mr. Bateson. All these works are of high value and importance. Special reference should also be made to Professor Weismann's Essays.]

SCIENCE AND FAITH.

I. MAN AS AN ANIMAL.

IN THE year 1878, in the course of the first Exposition of Anthropological Sciences at Paris, I became engaged in a controversy with a celebrated Dominican, Père Didon, on the irreconcilability of science and faith. In 1893, in a memoir which appeared in *L'Anthropologie*,¹ I broached the conclusion that man as an animal and man as a member of society were contradictory, that society was a compromise between the truths of science and the necessities of practical conduct, and that to establish firmly the foundations of ethics, it was necessary to admit as dogmas, or articles of faith, which should be exempt from discussion, certain principles that were implied in all social solidarity, such as justice, the distinction of good from evil, altruism, etc.

These conclusions were distressing to me. I have not ceased since to ponder on them. I have searched for some property of living beings possessing or not possessing a nervous system that would give body and objective reality to these dogmas. I have re-read the beautiful pages of Herbert Spencer and other philosophers on the subject. I have devoted my best attention to Guyau and Fouillée's "ethics without obligation and without sanction." I have read the works of Dr. Paul Carus, his *Problème de la conscience du moi*, which has been translated into French in the Library of Contemporary Philosophy, the lectures which he delivered at the Congress of Religions during the recent World's Fair in Chicago,

¹ Paul Topinard, "Quelques conclusions et applications de l'anthropologie," in *L'Anthropologie*, 1893, pp. 657-696.

his *Primer of Philosophy*, etc. The doctrine which Dr. Carus upholds in *The Monist* and *The Open Court* is seductive. It may be that a better one cannot be found. It is ingenious and accords perfectly in its premises with the facts of science. But it swerves aside in its applications. The spirit which conceived the first part is not maintained in the second; the seam is visible. Will this doctrine convert the masses, which it is our aim to lead into the ways of righteousness? Will it prove sufficient as a sanction of the moral obligation? That is the question.

We are among scholars. We are seeking in the same paths. We are in accord as to the object aimed at. Let us then be clear.

The first thing requisite is to bring matters scientifically to a head, to look the enemy squarely and fearlessly in the face, and to let the truth stand forth in its full entirety and nakedness. It is necessary, therefore, to recall what we know about man and societies, that is, to ascertain what is the upshot of the final data of the science of anthropology. The field is vast—too vast to be traversed, even hurriedly, in its whole extent. But there are parts of more importance than others, and of these I may be permitted to give a brief recapitulation.

* * *

Anthropology, in its broad sense, comprises everything that relates to man, and is divided into anthropology in its restricted sense, or anthropology proper, and into ethnical anthropology. The former studies man as an animal, first the individual, then the principal varieties called races,¹ and lastly the species in its relation to other species—all three in the double point of view of morphology and biology. The second studies men as associated together in peoples, tribes, civilisations, and societies, and that in all points of view, as to distribution into different epochs, history and pre-history, modes of life, habitat, alimentation, industry, manners and

¹Races are permanent varieties of the species, I say. They should not be confounded with peoples or with languages. Races belong to the province of the anthropological naturalist, and can be extricated from the peoples among which they are mingled only by the special knowledge and methods of the naturalist. The word should never be used in ethnical anthropology.

customs, languages, religions, arts and letters, institutions and ideas, morality, etc., and their evolution from the past to the present; it is divided into ethnology¹ and sociology.

I have long admitted a third division of anthropology for moral or psychical man. Reason being the highest attribute of man, it seemed to me expedient to assign to man a place apart, were it only for the purpose of applying here certain methods not employed in the other two divisions. But the elements of which this third division is composed require to be examined alternately in man as an animal and in man as a member of society. In this phase of my scientific ontogeny I said that anthropology had three objects of study, animal man, mental man, and social man. To-day I see drawbacks to this division and reduce the objects of anthropological study to two only: animal man and social man.

Anthropology, in the restricted sense, is the anthropology of Blumenbach and of the French school. It belongs to the department of the naturalist, or of the physician with the training of a naturalist. It thus embraces all that the natural history of an animal involves, and is distinguished by no special feature except the very extensive scope of certain of its chapters. The knowledge which it necessitates is derived from three sources: (1) the knowledge which the naturalist acquires concerning all organised beings, particularly animals, but notably Vertebrates, Mammals, and Primates, and which he applies as his taste dictates to this or to that animal; (2) the knowledge which the physician acquires, anatomy, physiology, pathology, embryogeny, teratology, mesology, etc.; (3) the knowledge which the anthropologist reserves for his own proper domain, and which relates to the two following grand subjects about which all his researches turn:

A. Human races in the present and past, their origin, relationship, and history.

¹ I should not have employed this word if I were writing for France, because it was wrested from its legitimate meaning sixty years ago by W. Edwards. He took it as synonymous with the natural history of races, whilst it designates the general history of nations.

B. The human species, its various characters, its place in the zoölogical classifications, its genealogy.

We shall pass over the races and speak only of the species. To be sure, classifications are only "artificial expedients," to use an expression of Lamarck, or "subjective conceptions to which no absolute demarcation corresponds in nature," to use the words of Herbert Spencer. Nevertheless, they express and sum up the state of our knowledge, and that is precisely what we want. Classifications, not systematic but natural, give a succinct tableau of the common characters or resemblances that animals present, whether of the primary, secondary, tertiary, or other order, corresponding to groups more or less circumscribed, called divisions, classes, orders, families, genera, etc.—and of the particular characters or differences which distinguish each of the included divisions of these groups. To give a place to man in the classification means to strike the balance of his resemblances and differences with the different animals, to decide upon the distance which separates him from the nearest members of his special group, and lastly, to assign to him his hierarchical position in the animal scale. This is what we shall now attempt to do.

First of all, man is a Vertebrate, because, like all animals comprised in this division, he possesses an internal skeleton, the fundamental constituent of which is a chain of vertebræ (or better a dorsal cord, the point of departure of this chain) provided at the front and back with costiform arches which separate the body into two cavities, one anterior, for the viscera, and one posterior, for the cerebrospinal system. Secondly, man is a Mammal, because, like all animals of this class, he has breasts, hair, a neck, four members, a corpus callosum, a heart with four chambers, a complete diaphragm, two occipital condyles, etc. Lastly, man is a Primate, because, like all other accredited animals of this order, he possesses a special type of brain characterised by the absence of the limbic lobe of other terrestrial mammals, by a prominent frontal lobe, by a parietal, a temporal, and an occipital lobe, by a peculiar system of convolutions, and by a cerebellum covered by the hemispheres; because he has a type of skull no less special, characterised by the

rounded form of the occipital part, by developed frontal fossæ, by eye-sockets closed at the back, near to each other, and pointing forwards, by an os planum, by a mandible, of which the two parts are fused at birth, etc.; because he possesses an anterior member more or less adapted for prehension, a fore arm capable of movements of pronation and supination, a hand, that is, long and slender fingers, a thumb relatively short and opposite to the other fingers, a small and exceedingly mobile wrist; because he has three kinds of teeth with omnivorous molars, flat nails on the hands and feet, two pectoral mammæ, a unilocular uterus, a discoid placenta, a simple stomach, etc.

The Primates include the Lemurs, or semi-apes, sketch-plans of the Primates, and transitional links from the Insectivora (which were undoubtedly without placentæ) to the real Apes; the Apes, or Primates proper, comprising the Arctopithecii, a small family belonging to the New World, the Cebidæ or common monkeys of the New World, the Pithecii or tailed monkeys of the Old World, and the Anthropoids, or Apes without tails, also of the Old World.

What position does man occupy in this group of animals? Which does he most resemble? Does his distance from the nearest make of him a suborder, a tribe, a family, or perhaps a genus? Hitherto we have spoken only of the characters which are common to man and to the other animals. We have now to speak of their differences.

These differences in man as compared with the Apes have been sought for with the greatest care in all parts of the body. We no longer live in the time of Galen when to learn the anatomy of man the Barbary ape principally was dissected. We notice to-day the most unobtrusive characters, such as we should never pay attention to, were it not that they concern our own species. It happens thus that the differences in question are exceedingly numerous but reducible to a few of primary importance. In the skull, for example, craniometry furnishes at least twenty, which are reducible to three. In the skeleton, the muscles and the viscera, there are more than thirty worthy of notice, but all reducible to one. Let us examine the most important.

But first a remark. To determine the distance which separates several species or groups of species, that is, their degree of unlikeness, their mean specific types must be considered, and not, as is sometimes done, their extreme individual variations. By the last method, the characteristic differences are submerged, and in general we arrive at a graduated but continuous series in which the lines of demarcation disappear, as Herbert Spencer has said *à propos* of this question. The method of mean types alone exhibits the intervals sought.

Another remark. To solve our problem we are obliged to proceed analytically, that is, we must take up the characters one by one and construct from their gradations in the different species, a scale which admits of its appropriate conclusions. Now these conclusions are sometimes contradictory. The truth can be extricated only from their combination, otherwise called their synthesis.

The first characters distinguishing man from his nearest animal neighbors, relate to the cerebral nervous system. Let us hurriedly follow its developments. At the bottom of the invertebrate scale a few fibres and nervous cells are discoverable, at first dispersed. Then aggregations of cells or ganglia appear, among which are easily noticeable those consecrated to the special senses, at the point where the cephalic extremity is constituted. In this last place they approach each other in pairs with a tendency to fuse. Thus the brain takes its origin. In the lowest vertebrates it is represented by a succession of swellings or lobes having their seat on the prolongation of the spinal cord. The largest are the olfactory and optical lobes, the smallest are the future hemispheres. Soon the rôles of the parts are reversed, the rudimentary hemispheres grow larger, expand in all directions, cover and envelop the lobes beneath and end at the summit of the scale by constituting alone almost all of the brain. The grey cortical substance, which is the essential part of the brain, finds thus an extensive surface, which ultimately not sufficing for the demands made upon it folds and refolds upon itself and by this ingenious artifice is increased in extent still more. The results are the cerebral convolutions. The folding takes different directions, and affects different types in the different classes of mam-

mals. In the Primates it grows together with the increase of volume. The hemispheres, divided, as has been said, into four lobes, end at the back by running over the cerebellum, and in front by hanging over the face. The hemispheres efface the last traces of the limbic lobe, and by a final leap attain in man their highest degree of complexity. In this last respect there is only a difference of quantity, which is not striking, between the anthropoids and man. If we place on a table by the side of each other two brains, the one of an orang, for example, and the other of a man, we should recognise the latter, apart from its volume, only by the asymmetry of the lateral convolutions, by their smaller size, as also by their number and by their sinuosities, especially of the third frontal convolution, that of language.

As to volume the difference is striking. The brain of man is larger than that of three large anthropoids, both in relation to volume of body and to volume of skull, and absolutely in that its mean weight is treble that of the anthropoid brain.

Next to the differences between man and animals exhibited by the nervous system, come those which concern the organs of locomotion. All the members are locomotor in their origin; prehension of objects being performed directly with the mouth. From the first steps of Reptiles on solid earth the members are seen to become differentiated in a definite manner. When they creep along the fore members grasp the soil and pull the body, the hind members brace themselves against the soil and push the body. The fore members act as prehensile organs, the hind members as locomotor organs, *par excellence*. Both, thus, acquire distinctive initial characters which they never relinquish. Later, in the Mammals, the adaptation varies with the mode of life, the needs, and the habits. Excepting man and some aquatic species, the mammals are essentially quadrupeds, but in different degrees. In the Marsupials generally, the anterior members are utilised as organs of prehension; among some, the posterior extremities are organised as hands. In the Ungulates, or hoofed animals, the adaptation is exclusively quadruped. In the Unguiculates the anterior members serve accessorially for prehension. In the lower Primates, which are ordinary

arboricole animals, the necessity of clinging to branches develops the function of prehension in the anterior members, or in some species in the posterior members. In the middle Primates, or Monkeys, the adaptation to arboreal life is perfected and increased in all four members. They are at once quadrupeds and quadrumanes; the entire body is in unison; they are expert gymnasts, running from limb to limb, shooting backwards and forwards, and hanging downwards by their four extremities and by their tail, which in Cebidæ is prehensile. Their forehead is the most advanced product of adaptation in this direction which the animal scale has yet shown. Their posterior hand is still a foot, but modified in the direction of a hand. In the Anthropoids the same is also true, except that the posterior hand resembles more a pair of pincers with curved tongs, and that the tail has disappeared. In man, adaptation has restored the original character of the four members. The anterior members have become fixed in the direction begun in the monkeys; the posterior members have abandoned absolutely that tendency and are entirely adapted to the locomotor function. Man is the only perfect bipedal adaptation, excepting birds, that the animal kingdom presents, just as the Cervidæ are, not the only, but the most perfect adaptation of the quadruped attitude and gait.¹

This brings us to the second group of characters which distinguish man from monkeys—namely, to the erect attitude which is peculiar to man. Monkeys, we have just said, are arboricole animals, marvellously adapted to their mode of existence. Their body is light, their vertebral column is supple, their members are long, slender, and mobile, their four extremities furnished with hands. On the ground they walk awkwardly on all fours. They stand erect sometimes by seeking a point of support with their fore hands on a tree or a rock. Some Pitheci and Cebidæ even show in their viscera indications of adaptation to this last occasional attitude. Some Cynocephali show traces of it also in the vertebral column. In the Anthropoids, two of which have a comparatively heavy gait, walk-

¹ See P. Topinard, *L'homme dans la nature*, Chap. VIII., Paris, 1893. Bibliothèque Scientifique Internationale. F. Alcan.

ing on the ground is more frequent. They walk in a half-bent position, supporting themselves on the dorsal surface of the fingers and the outer edges of the feet. Do they straighten up often? In any case, the adaptation to this straightening up has produced a marked advance in the viscera, in the vertebral column, and particularly in the pelvis. As an offset, the head and the lower members have made none. In the pelvis the anthropoid approaches very near to man. In the foot he is radically different from man; in fact, he is more simian, more monkey-like, than the other Apes. The foot, the calcaneum, and the astragalus fold inwards upon the tibia, so that the sole of the foot can apply itself laterally to the trunk of a tree in climbing; the first toe, which is short in comparison with the other toes, but slender, is widely separated from the others, and plays less the part of a finger with the power to oppose the others, than that of a pincers enveloping the limb and running to meet there the other fingers, which are long and recurved.

Man himself is terricole in habits, with vertical carriage, and walking on two feet. In all parts of his body he is marvellously adapted to this mode of life. His head rests in equilibrium upon his vertebral column without effort. He has not the large posterior cervical ligament which prevents the head from falling forwards in other mammals. His vertebral column is solid, with a double dorso-lumbar curvature, and is larger in the lumbar region, so as to fit firmly into an enlarged pelvis. Everything in the lower members is arranged to support the weight of the body. The tibio-tarsal mortise permits only exact movements of extension and flexion. All the bones of the tarsus are heavy and strong. The axis of the tibia, the vertical axis of the astragalus, the antero-posterior axis of the calcaneum, the axis of the foot, are all in the same plane. The first toe is large, almost of the same length as the second, and parallel to it. Its cuneo-metatarsal articulation is an arthrodia which permits neither adduction nor abduction. The sole of the foot is arched and rests solidly on the ground at three points. The foot of man is a masterpiece of adaptiveness to the vertical attitude, and the opposite of that presented by the Monkeys: Pitheci, Cebidæ, or Anthropoids.

The characters derived from the differences of attitude furnish, accordingly, contradictory arguments; one group putting man in the same family with the Anthropoids (the pelvis, vertebral column, and viscera), the other placing him in a different order (the foot). In my opinion the latter factor is more potent.

The other differences to be noted are not of such great importance. They are such as come from the gradual perfection which takes place in the adaptation of the upper members to the function of prehension, commenced in the Lemurs and even in the Reptiles, attaining a high stage in the Monkeys, and gradually specialised in a different direction in man. The whole member takes part in the action here and not, as is commonly believed, its terminal segment only. In monkeys the fingers are slender, long, and recurved; the thumb is short and also slender; the trapezo-metacarpal articulation which supports it permits thus the two movements of oblique adduction and abduction, or of opposition. Nevertheless, this articulation in its movements is rude. It is a kind of tongs with curved branches, an organ made for encircling the limb of a tree, and only secondarily to grasp small objects and break them into pieces. On the other hand, the radius is capable of a movement of rotation on the cubit of about eighty degrees, and the articulation of the shoulder is very mobile. In the Anthropoids the rotation of the radius rises to one hundred and sixty degrees about, and the scapulo-humeral articulation increases still more in mobility. But the hand undergoes no improvement. In man there is no notable change either in the hand or in the rest of the member, but all has become pronounced and has more precision; a certain simian fold of the palm of the hand has disappeared showing a marked independence of the index finger. The hand is an organ of prehension, an organ of exploration and of touch, and also an instrument.

It has been said that man alone possesses a true hand and that owing to it he can manufacture for himself tools. This is an error. The differences which it presents as compared with the hand of the most favored monkey in this respect, are only differences of kind. The faculty which enabled our prehistoric ancestors to manufacture the hatchets of St. Archeul, then to discover cleavage by repercus-

sion and the art of edge-making, was less the hand than the intelligence which directed the hand. The great dexterity which the human hand has acquired, for example, in playing on the violin or the piano or in the adjustment of the screw of a microscope, is the fruit of experience and intelligence combined. In fine, the point of departure of the hand was an adaptation to arboreal life, its point of arrival an adaptation to intellectual life.

The differences which are now to be noticed are more decisive. They relate to the disappearance of the snout, the consequent reduction of the nasal fossæ, accompanied by the effacement of the last vestiges of the limbic lobe, and especially to the reduction of the maxillary apparatus, caused no doubt by the transference and localisation in the hands of the function of prehension, before divided between the hands and the mouth. The orthognathism of man's face, which stands in such marked contrast to the frightfully bestial face of the Anthropoids, is the result of this.

We have reserved for the last the group of differences presented by the other parts of the skull, because they result from the association of three orders of adaptations or influences on which a preliminary word is necessary, viz.:

1. The volume of the brain which, in its increase from the Anthropoids, or some analogous type, to man, exerts a strong pressure on all sides, elevates the vault of the skull, depresses its base, tips the frontal bone forwards, the occipital bone backwards, and adapts everything to its wants; (2) the adaptation to the bipedal attitude, which takes place by the overthrow backwards of the occipital bone, above mentioned, where the occipital foramen, which in the Monkeys and other mammals is at the back of the base of the skull and in man is in the centre of it, is transported from backwards forwards; (3) atrophy of the facial part of the skull of which we have just spoken. One of the consequences of this atrophy, associated with the development of the anterior lobe of the brain and of its frontal compartment, is the formation of the forehead, one of the distinctive traits of man.¹

¹At the other extremity of the face the chin also is a human character.

I have set forth at length the mechanism of this transformation of the animal skull into the human skull in *L'Anthropologie*.¹

All in all, then, we are led by our rapid review of the cranio-logical and craniometrical characters to the following conclusion. There exist among the Primates three widely different types of skull; first, that of the Lemurs, which is that of the other mammals generally; secondly, that of the Monkeys, both of the Old and of the New World, including the Anthropoids,—a type of skull which is intermediate between that of the Lemurs and that of man; and thirdly, a type which is *sui generis*—that of man. Accordingly, an abyss which nothing fills separates man from the Monkeys. On the other hand, here and there, in isolated characters, some Monkeys, now a Cebus, now a Pithecus, now an Anthropoid, and usually always the young, present some point of resemblance with man.

There are still other differences to be noted, but of less interest. Thus, we have characters of growth; for example, sutures which close earlier or later. We have also simplifications of organs or secondary harmonical adaptations, such as the decrease of the usual number of nineteen vertebræ in Monkeys to seventeen in man; the arrangement of the summit of the sacrum and of the coccyx in consequence of the disappearance of the tail both in the Anthropoids and in man; the atrophy of the laryngeal sacs, which have become unessential after the acquisition of language; the disappearance of the auditory bulla of Lemurs, progressive in the Monkeys and the Anthropoids and replaced in man by the mastoid cells, etc., etc. Other differences are the particular adaptations to the life and the new habits of man, such as certain modifications of the condyles and of the articular surface of the mandible, absolutely acquired, and certain characters in the structure of the molar teeth, on which I must dwell.

I wish to speak, not of the canine teeth, which are less voluminous in man, but of the tubercles or cusps of the superior and inferior molars. Like the pelvis and the union of the sacrum and

¹P. Topinard. "La transformation du crâne animal en crâne humain," in *L'Anthropologie*. 1891. P. 649.

the coccyx, the fundamental types of these molars join man and the Anthropoids together in a common group, and distinguish them conjointly from the Pitheci, in which the corresponding types are entirely different. Their construction is as follows: Above we have a quadricuspidate type with an oblique crest separating the fourth or postero-interior tubercle, from the three others. Below we have a quinquecuspidate type, arched, with three external and two internal tubercles. But here is the extraordinary fact. In man and not in the Anthropoids, two new types of which we can follow the gradations, take the place of these very frequently: one above tricuspidate by the disappearance of the fourth tubercle, the other below quadricuspidate like a cross. Professor Cope, who has studied the first of these accidental types, the tricuspidate, sees in it a reversion to the lemurine type. For my part I take it to be an adaptation to the alimentary system of man, a perfective character in process of formation, one of the traits of the man of the future. Even in the absence of other proofs, and others do exist, this fact shows that man is still in process of evolution, and that if he is progressing by his brain and its functions, he is also advancing and being transformed in other parts.

But I must hasten to conclude. Of the differences we have discovered, some are equivalent to intervals of an order or sub-order, others to intervals of a family, others to intervals of a genus. It is incumbent upon us to weigh the physiological value of each, to set them off one against the other, and to obtain their approximate mean. The brain and the skull are of most importance; the attitude comes next, the hand, the teeth, the muscles, and viscera come last.

Briefly, then, my conclusion is: (1) that the Cebidæ, the Pitheci, and the Anthropoids, all of them arboricole creatures by equal rights, cannot be separated from one another, but that the same name of Monkeys properly applies to them as much as does that of "quadrumane" given by Cuvier; (2) that in this group the Anthropoids have reached the highest stage of evolution and are consequently less remote from man; (3) that the distance of the monkey group from man is on an average greater than that which

commonly separates families and *a fortiori* genera, and less than that which separates orders; (4) that this distance is about equal to that which separates the Monkeys from the Lemurs; (5) that man, therefore, forms a suborder in the order of Primates as shown in the following table:

ORDER OF PRIMATES.

First suborder : Man.

Second suborder : Monkeys	{	First family : Anthropoids.
		Second family : Pitheciidæ.
		Third family : Cebidæ.
		Fourth family : Arctopithecidæ.

Third suborder : Lemurs.

To sum up, the Lemurs of this classification are simply the starting-point of the Primates. The Monkeys are animals adapted to arboreal life and perfected to this end. Man is an animal adapted to intellectual life and perfected towards this end.

Is it a consequence of this schematic statement of the intervals separating *present* man from the other *present* Primates that man is descended from the highest Monkeys, the Anthropoids? The question is prejudged, but not settled. Suppose we have two phyla or types. Both become differentiated into secondary branches or types. The latter come into different environments and different modes of life; they adapt themselves thereto and evolve separately. Some diverge from each other, others approach nearer to each other, others go along side by side. This is what is called resemblance by convergence and difference by divergence. Therefore resemblance and dissimilarity are not a criterion. This same view is applicable to human races. Two or three may have originated apart at remote epochs and have come to resemble each other by convergence. The unity or the plurality of the origin of the human races is not a solved question.

Be that as it may, in the hypothesis of a single origin two opinions are tenable. One, which Professor Cope defends, is based upon palæontological evidence, and makes man descend directly from certain Eocene Lemurs, through a series of precursors doubtless, who have lifted him up to his present state, but of which we have

as yet no direct evidence. The other, which is based upon existing species, makes man descend directly from the Pitheci or the Cebidæ, or, which is more probable, from the Anthropoids.

This is what I wrote on the subject three years ago, with regard to one character. I modify the phraseology slightly: "From my studies on the cusps of the molars and premolars of Primates I am disposed to conclude that the type of Maki and Tarsius, the first group of Lemurs, has engendered on the one hand that of Lori, Propithecus, and Galago, the second group of Lemurs, and on the other hand that of Indri, the third group of Lemurs; that the type of Lori, etc., has given the Cebidæ, and that of Indri the Pitheci, from which would have issued the common fundamental type of Anthropoids and of man."¹

What is certain is, that man by all of his characters is descended from some Primate. The brain, the hand, and all that relates to his way of standing, with the exception of the foot, are proofs of it.

But from what branch and in what epoch was the initial shoot thrown off? That is a question which it is wise to reserve for a future time. We should not forget that families and genera of Primates must have existed which have now utterly disappeared, and that the present types may be only descendants of others of which we know nothing.

The comparison between man and the other animals is not restricted to morphological characters. If anthropology gives them the preference, the reason is that they can be got at, analysed, and weighed with great precision, and that they faithfully reflect the functional characters, in virtue of the principle that the "function creates the organ." The proper complement of the preceding review, therefore, would be the examination of the physiological characters and particularly of those which relate to the really characteristic organ of man—his psychological characters. But that would carry us too far.

¹P. Topinard, "De l'évolution des molaires et premolaires chez l'homme," in *L'Anthropologie*, 1892, p. 709.

We should have to show, if we entered on this subject, that man has the same functions as animals, slightly modified here and there, the same general needs, the same modes of satisfying them, the same sentiments, desires, impulses, and motives, the same reflex actions, with or without the intervention of the sensorium. We should have to show the psychical faculties that are brought into play between sensation and action, isolated and rudimentary in this or that lower or higher animal, less isolated and more marked in others, forming associations in greater or less numbers in one class, and attaining a remarkable degree of development in another, as in the elephant, the dog, and the ape, but arriving at their highest degree of differentiation and complexity in man when the volume of the brain and its convolutions have reached their maximum. We should have to show in these animals the powers of curiosity, attention, observation, reflexion, determination, the sense for cause and effect, memory, and incontestably ideas, for which only the formula is lacking. The studies which have been pursued on this subject in England for many years teem with examples. It would be our task to show in the Apes malice, imitation, the need of play, the spirit of examination, of sympathy, of defiance, the need of talking, of hearing and being heard, the sense for assistance in raising a large stone or in crossing a river, the sense of mutual understanding for making forays or for self-defence, the sense of common utility in disposing sentinels, who are punished when they permit the band to be surprised, etc. Is there reason to be astonished if one of these animals, having acquired by dint of hard efforts articulate language which helps him to fix his memories and ideas and simplifies these operations, or by having become gradually more precise in his acts of reason, more careful in his acts of will, more highly conscious of himself, more inventive in satisfying his daily needs,—is it to be wondered at that he should have created for himself new and peculiar needs, even physical in character, and that little by little he should have lifted himself up to the level of the æsthetic sense, the spirit of philosophical inquiry, and the love of truth?

True, the volume of the brain and its convolutions are far from explaining all this. But there are other morphological factors of

mental power: for example, the number, size, and relation of the cerebral cells, and particularly their intrinsic qualities, which still vary so much with individuals that, in our species, a scale running from ten to a thousand, I should say, could be established for them. Think of the psychological difference between the extinct primitive races and the higher races of to-day, and in these last between men who think and act in a totally vegetative fashion, and the leading intellects of the nineteenth century!

Finally, from the morphological characters which we have summarised, and the psychological characters which we have alluded to, this fundamental truth emerges, which must be distinctly emphasised: that man, perfect as he may appear to us, is still not a being apart in nature, but that he is by his whole organisation continuous with the other zoölogical species, that he is connected with them by a multitude of characters, if not by all, and that the differences are only relative differences of degree in an evolution in the same direction, augmentations and diminutions of organs or of parts of organs more or less utilised, modifications of development, primary adaptations to new habits and modes of life, secondary harmonical adaptations, etc. It is that man is an animal by the same right as every other vertebrate, mammal, and primate, and that anthropology properly so called is merely a chapter of zoölogy.

No, man is not a creature apart in creation, and it is rather a concession to the spirit of the times than a protest against the idea of our animality, that some naturalists have proposed to place apart all that concerns the intellect, and make of man a fourth kingdom—the human kingdom. De Quatrefages, who advanced this view after the precedent of Isidore Geoffroy St. Hilaire, averred none the less that “man was only an animal, nothing but an animal”—the rational animal of Aristotle and Linnæus, Franklin’s tool-making animal.

Certainly, man has been favored by evolution. The organ which alone really characterises him appears from its first progress in the fishes to have been predestined for its future rôle. In the birds the hemispheres have already much importance, but their development is arrested. In the various orders of mammals, the

brain has more progress to show, but does not go so far as to overshadow adaptations in other directions. Evolution furnishes here various types, all of them highly harmonious and highly adapted to the habits, but relating to muscular force, rapidity of progression, or elegance of form. In the elephant the cerebral organ and its faculties attain a certain superiority, but the enormous size of the animal and the exigencies attending on the needs of its tremendous body prevent its advancing beyond this stage. In the order of the Primates alone, evolution, modest in its beginnings but always properly directed, takes a happy leap and attains its highest stage in man. But the favored lot of man, that good luck of which the acquisition of language was certainly the determining cause, has not at all deprived him of his animality.

Whatever may be said to the contrary, man forms an integral part of that great tree, which took its birth untold centuries ago in the moners, which grew and waxed great throughout the ages, and which gave out the boughs called Worms and Crustacea, Reptiles and Mammals, and those others called Carnivora and Primates, from which have issued so many innumerable branches, among them man. As Monism would have it, this tree is one and continuous in all its parts. Some of its branches are descendent, others ascendent, others parallel or divergent (retrograde, progressive, parallel, and divergent evolution). Many have vegetated, or have arrived at the goal of their evolution,—or of their potencies, as we might say,—and have died, leaving behind them no trace. Many have survived without notable alteration, or have perfected themselves and multiplied.

The extinct and now existing species are the extremities of these boughs and branches at the different epochs of the world. Man is merely one of them, having appeared in the Pliocene or Quaternary epoch at the summit of some ascending branch. All these species have thus the same origin, at the expense of previously existing species; all have risen by a similar mechanism, have evolved according to the same laws, and have, or will have, the same destinies: to bear witness to the splendor of nature and to disappear, leaving or not leaving a posterity.

I shall sum up these laws or factors of evolution, as follows :

1. The law of spontaneous expansion or proliferation of living matter, first cause of evolution.
2. The law of spontaneous variation of living matter ; whence result, with the concurrence of other laws, the multiplication and differentiation of forms, the division and specialisation of labor.
3. The law of reaction of living matter (irritable or sensible) in the presence of external or internal stimuli ; whence results the law of conformity of organs to their ends or adaptation to the environment and conditions of life.
4. The law of heredity or of resemblance ; whence result, with the concurrence of favorable circumstances, the accumulation and fixation of habits and of characters insensibly developed.
5. The law of the survival of the best equipped and the best adapted.

This evolution is effected through individuals and is furthered by their free competition, their struggle against the environments, circumstances, and conditions of existence. Those most favored by some spontaneous variation, those which know best how to utilise their advantages, which know best how to conform to circumstances, the best adapted and strongest, the nimblest, those most obedient to the injunctions of nature, survive and multiply.

This struggle operates only indirectly among species, although the general result of it is the modification of their type ; it operates through individuals. It is they to which this or that variation, this or that adaptation, this or that particular circumstance gives survival and predominance. The instinct of conservation, the necessity of satisfying personal needs, the desire to enjoy life to the full, all exalts individuality. For the individual the world is what he perceives—his series of impressions from his earliest infancy, the memory of his acts, of his struggles, and of his sufferings. His sensorium is the focus in which all is gathered. He is perforce subjective. He is by sensibility and by logic egocentric. *I* first, *others* afterwards. What touches him has his first consideration ; what touches others has it not till he is moved to it by impulses, by interest, or by pleasure. If others succumb it is a void for him ; if

they suffer he attempts to realise their sufferings, shares them, and will even seek to assuage them, often with the ulterior thought that in similar circumstances they will render to him a like favor. If he makes sacrifices, if he loves his companion, if he takes care of his children, he is recompensed for it by the pleasure which he derives therefrom. The more powerful his individuality is, the more powerful is he. The more energy the individual has, the more he affirms himself, the more his life is fulfilled, the happier he is, and the more he shares and assists in the progress of the group to which he belongs.

There are, moreover, two beings in the individual: one, the initiative element, which reasons, wills, and is the fruit of his personal education; the other, the routine element, which is the product of habits acquired by his ancestors, repeated and established by accumulated heredity—habits of family, race, species—organic, motor, and psychical habits. To the last are due the greatest number of the acts of life, our impulses and so-called innate ideas; the first intervenes only occasionally. As I stated in my memoir of 1893 above cited, as Dr. Paul Carus has well expounded in his book *Le problème de la conscience du moi*, and as the majority of physiologists to-day admit, all acts are more or less reflex and co-ordinated beforehand for every aim that is to be attained. The centre of reflex action in the vertebrates is in the spinal cord or in its intracerebral prolongation. In one category of acts an external or internal peripheral impression is the origin of the action; in a second category the excitation comes from the brain and is a sensation or a sentiment, in both cases unconscious or obscurely conscious; in a third, the excitation still comes from the brain but the sensation or the sentiment is entirely conscious, gives rise to a ratiocination, a decision, a given order. The two first categories, accordingly, are more or less automatic, the second being so both by the act and by the incitation. They answer to what are called instincts. These may be divided into instinctive sentiments and instinctive acts, and have as common characters on the one hand production without the intervention of reflective volition, and on the other ancestral origin.

Now instincts are the rule in animals and the commonest case in man. It is they that control individualism, that bring back incessantly and unconsciously to man his antecedents, that have as their object what is useful and as their *raison d'être* submission to the exigencies of struggle and to the higher laws of nature. Is the third category of acts, those which take place as the result of deliberation, commoner? Do they carry with them a vestige of altruism? Are they able in certain circumstances to modify or to annul the instincts? These are questions which we cannot examine without encroaching on the subject of social man, which lies beyond our present task.

Anthropology, in fine, as long as it does not occupy itself with peoples, civilisations, and social constitutions, discovers in man an animal only, to which it applies the general truths which natural history and particularly zoölogy teach it. For anthropology there exist only differences of form and degree between invertebrates and vertebrates, and between the different classes, orders, families, and species of these. The laws which control one rule the others. The mechanisms, theories, and doctrines which apply to animals apply to man, and *vice versa*. As they have the same substance and are of the same origin, so they have the same destiny. From the irritability of a moner to the sensibility of a mollusk endowed with a nervous system; from the sensibility of an insect possessing the rudiment of a brain to the sensibility of the horse, of the ape, or of man, who is provided with a centralised brain with highly differentiated sensibilities, anthropology sees degrees only. From the consciousness entirely mechanical of the moner, distinguishing what is beneficial from what is injurious to it, to the rudimentary consciousness of the fish or the reptile, to the consciousness of the dog or the elephant, and lastly, of man, it still sees only degrees. A professor in a Catholic university, whose name I may withhold, conceded, in conversation with me one day, the doctrine of transformism. "Your doctrine does not disturb in the least the teachings of the Church," he said; "we will give you the body if you will leave us the soul." "Very well," I answered, "but what do you understand by the soul? Do you admit its existence in animals?" "I do," he replied,

“but as a *less developed* soul.” That professor was an intelligent man. Such is, in fact, the soul in man; such it is in different degrees of evolution in animals. What is true of man is true of animals, and *vice versa*.

There are two methods of considering nature—one from our own or the human point of view, and the other from the point of view of Nature herself. For Nature, the spectacle which we offer is that of a busy hill of ants which swarm hither and thither with no aim beyond their present life. For Nature, the species succeed each other with no other motive than to bear witness to their marvellous proliferation. For Nature, everything that *can* take place in her broad bosom *does* take place; the elements combine, dissociate, meet again, forms succeed forms, disintegration follows integration, equilibrium is fleeting, there is no end, the movement is perpetual. Man in this whirlpool, like all the rest, is but a grain of sand; he has to think only of himself. He may fashion for himself ideals, he may assign a goal to his progress, he may impose a programme on his beliefs, he may close his eyes to reality. Well and good! But the thinkers that exercise their ingenuity in adapting him to the conditions of his existence, in creating for him a world of his own, in laying down the rules for his conduct, and in seeking foundations for it least open to attack, must not forget that his only cherished aim is his own happiness.

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CRIMINAL ANTHROPOLOGY APPLIED TO PEDAGOGY.¹

NOTHING vexes me more than to have to hear or to deliver lectures where the speaker talks from vanity, while the public listens from complacency or politeness, and either learns nothing, or remembers nothing of what is learned. On the present occasion, however, I have accepted my invitation without misgiving. In fact, I should have sought the privilege myself, without your asking; for I believe that some practical applications of criminal anthropology to pedagogy are so strikingly evident and important that if popularised among teachers they will have the power to bring about a genuine revolution in the prophylaxis of crime. As you know, a science exists which by the help of very simple instruments, such as balances, rods, dynamometers, spirometers, craniometers, etc., measures the length of the human body, the length of the arms, the probable capacity of the cranium (calculated from the circumference, the longitudinal curve, the transversal curve of the head, and the two diameters), the length and breadth of the head, the respiratory capacity, or quantity of air that enters into the lungs (spirometry), and the strength of each of the two hands or of the two together (dynamometry). Now these measures vary remarkably from childhood to maturity, and values have been established for these variations, which you may study in the accompanying table, drawn up for the average of the two sexes.

If a distinction is made between the sexes, it will be discovered that weight, stature, and even cranial capacity are almost equal and

¹ A lecture delivered before the teachers of Turin.

even more developed in females prior to the age of puberty; but from that time on the male exceeds in strength and spirometric capacity. But anthropology also studies a series of anomalies presented by the heads and faces of men.

Capacity. First let us seek an approximate estimate of the quantity of brain contained in the skull. There is a method quite approximate of determining the internal capacity of the cranial case. It is obtained from the sum of the cranial circumference plus the

AGE.	HEIGHT.	WEIGHT.	CIRCUMFERENCE OF THE SKULL.	MUSCULAR FORCE.	VITAL CAPACITY.
1	0'60	9	400		
2	0'70	11	455		
3	0'79	12		11	
4	0'97	14		17	
5	1'03	15		19	
6	1'06	17		22	
7	1'14	19	470	25	845
8	1'15	20	475	34	1050
9	1'20	22		40	1210
10	1'26	24		46	1430
11	1'28	27	445	58	1500
12	1'32	29		64	1800
13	1'37	34	526	82	1400
14	1'40	38		88	2100
15	1'49	43		106	2400
16	1'51	49		112	2030
17	1'52	52		118	3060
18	1'54	57		122	3200
19	1'56	60		129	3250

longitudinal curve, plus the transversal curve, plus the longitudinal diameter, plus the lateral diameter. On an average, the sum of such measurements gives results varying from 1480 to 1540 cubic centimetres. Compared with the true weight of the brain this method gives an error of about a hundred cubic centimetres, not counting the errors due to sclerosis, or hardening, so common in the skulls of insane people. Of this defect we have the following different forms:

1. *Macrocephaly*, the skull too voluminous, generally inclined to be round. Capacity more than 1800–1900 cubic centimetres.

2. *Microcephaly*, the skull unduly small, especially in the forehead. Capacity less than 1000 cubic centimetres.

3. *Scaphocephaly*, the skull shaped like a roof or the keel of a ship along the median anteroposterior direction, with forehead and occiput prominent, parietals quite narrow, form elongated, sometimes with extreme dolichocephaly. When these pathological characteristics are slight, the skull is called scaphoid or subscaphoid.

4. *Plagiocephaly*. A certain asymmetry exists in all skulls, but the exaggerated asymmetry of one side (plagiocephaly) constitutes one of the special characteristics of lunatics, especially epileptics.

5. *Trochocephaly*, the skull ultra-brachycephalic through exaggerated development of the transverse diameter corresponding to the temperofronto-parietal region (pterion).

6. *Platycephaly*, the skull with the top flattened and the vertex depressed.

7. *Clinocephaly*, cymbocephaly, the skull has the shape of a saddle, on account of the remarkable depression of the bregmatic region.

8. *Trigonocephaly*, the skull in subtriangular outlines, on account of the pointedness of the frontal region and the breadth of the two parietal fossæ.

9. *Eurycephaly*, the head with the skull narrow, almost always hypsicephalic, and with the face too broad; this is the exaggeration of the eurygnathism or broadened face of the Mongolian race.

10. *Hyperorthognathism*, the skull with the forehead pushed forward by the advance of the glabellum and the face; this deformity, generally caused by hydrocephaly, exaggerates the infantile type of the forehead, and the orthognathism or oval face with vertical maxilla of the Caucasian races.

But no knowledge of the sensory life of man is afforded by these data. We have, however, a means of studying the rapidity of a man's perception by means of Hipp's chronoscope; we can measure to the fraction of a volt the varying degrees of his general or dolorific sensibility by means of another special instrument, or more

roughly by means of the *Schlitteninductorium* of Du Bois-Reymond, counting as the measure of pain or of general sensibility the number of degrees the two bobbins of the machine stand apart. This is the first algometer ; it was introduced by me into science, and has been very useful in psychopathology. The distance apart of the two bobbins expressed in millimetres indicates the degree of intensity of the current and represents approximately also the degree of general or dolorific sensibility. Finally, a very simple instrument that any one can make is Weber's æsthesiometer, composed of two blunted points that are brought together or separated along a graduated rod, and whose distance apart measures the delicacy of the touch.

We have finally the campimeter to measure the area of the field of vision ; and graduated solutions of saccharine and strychnine, and of aromatic essence of cloves, for measuring the senses of taste and smell.

APPLICATIONS.

But you will ask me what the use is of all these measurements. Gentlemen, they serve an important purpose in theoretical pedagogy, which every year is feeling more deeply the need of supporting itself on anthropology, and has already learned from it new and highly practical methods for the education of the youth. But it is not of this that I wish to speak, but of a very important phenomenon connected with the origin of crime.

You know that one of the most important discoveries of my school is that in the child up to a certain age are manifested the saddest tendencies of the criminal man. The germs of delinquency and of criminality are found normally even in the first periods of human life. Pérez has demonstrated the frequency and the precocity of anger in children. In the first two months the child manifests by movements of the eyebrows and of the hands real fits of rage when one tries to bathe it or seeks to take something away from it. At the age of a year it goes so far in its anger as to strike people ; it breaks dishes, and throws them against those who do not act as it wishes, precisely as savages do.

Certain children, says Moreau (*De l'homicide chez les enfants*, 1882), cannot be kept waiting a moment for a thing they want without getting into an extremely violent passion, making weapons of whatever comes to hand, and breaking everything they can lay hold of, when they find their revengeful attempts impotent. These cases demonstrate the frequency and precocity of instinct and of revenge among infants. Even at the age of seven or eight months a child may be seen scratching the nurse when she tries to take away the breast from him, and striking back when hit. A child somewhat hydrocephalic, of slow development and understanding, became irritated at the slightest admonition or punishment, and this continued up to the age of six years. If he could strike the one who irritated him he quieted down; if not, he continued to shriek, and bit his hands with a gesture which we see repeated by caged bears when they cannot revenge themselves for threats made them.

Montaigne has said that lying and obstinacy grow in children just as their body does. All children, writes Boudin, are liars, but especially foundlings, who tell lies for fun. Pérez admits the truth of this statement, and adduces as first cause the freedom we take in deceiving children, even from the first months, in order to quiet them, wash them, and so on. Children lie in order to be allowed what has been forbidden them; often to avoid a reproof by not seeming to deserve it. A three-year-old girl, of wealthy parents and abundantly nourished, whose mother had naturally forbidden her to ask for additional food, requested another lady to give her something to eat, as she had had no food lately, and her mother would give her none. This child is also ambitious of being well dressed, and once told her mother that the lady upstairs had taunted her with not being decently dressed. Yet this was not true. They go so far even as to vilify their own brothers and sisters, and accuse them of imaginary crimes. One little girl, of good parents, smeared herself with carmine and accused her nurse of having wounded her. But the analysis of the red liquid revealed the falsehood.

The moral sense is certainly wanting in children in the first months or even the first years of life. For them, right and wrong

are what is permitted or forbidden by the father or mother, but not once do they perceive independently that a thing is wrong. Once a child of four years who had told lies was punished by his mother by being shut up in the cellar. On the way to the place of punishment he said to her : "But I deserve a good deal worse." But when punished by his grandmother by being simply sent into a dark room, he could not endure it, he considered it an injustice and kept crying out.

"This age is without pity," said La Fontaine, faithful por-trayer of nature. Cruelty, in fact, is one of the common characteristics of children. Says Broussais (*Irritation et folie*, page 20), "There is scarcely a child who does not abuse his power over those who are weaker than he." Such is the first impulse, but the cries of the victim check him unless he is born to ferocity, until a new instinctive impulse leads him to commit a new abuse. In general he prefers wrong to right ; he is cruel rather than good because he thus feels a greater emotion and can feel his own unlimited power, and therefore he is seen to break inanimate objects with delight. He delights in torturing animals, in drowning flies, he beats the dog, he smothers his bird ; sometimes he pours melted wax over beetles to dress them like soldiers, and thus prolong their agony.

Even that fundamental principle of megalomania and of criminality which is excessive vanity, self-absorption, is very great in children. In two families in which the principles of equality are maintained by the parents, the children even at three years of age observe the pretended artificial distinctions of social classes and treat with haughtiness the poor, and with deference the children of their own age whose parents are rich or titled. The same thing, for that matter, is also seen in animals ; for instance, in the watch-dog that barks at persons in shabby clothes. All children, from the age of seven or eight months, like to show off their new shoes or hats, and get angry when they are taken off. Many children, even those who afterwards show little intellect and slight precocity, at nine or ten months of age are wont to cry if they are not dressed in some particular pretty gown ; especially does this passion extend to red shoes.

One who lives among the upper classes has no idea of the passion babies have for alcoholic liquor, but among the lower classes it is only too common a thing to see even sucking babes drink wine and liquors with wonderful delight, and to see parents enjoy seeing them get drunk. Nor do we find lacking in early years, even at the age of three or four, obscene tendencies, though limited by incomplete development.

Now when the child becomes a youth, largely through the training of his parents and of the school, still more so by nature itself, when inclined to the good, all this criminality disappears, just as in the fully developed foetus the traces of the lower animals gradually disappear which are so conspicuous in the first months of the foetal life ; we have a genuine ethical evolution corresponding to the physical evolution. But in some unfortunates this evolution does not take place, just as in physical monsters there is arrest of physical development or of foetal evolution, and then the criminal tendencies become more marked than in the majority of youths, often breaking out in terrible atrocities and obscenities, and persisting ever after.

A magistrate sent me the picture of a child that had crushed the heads of two other children from mere jealousy at their being liked better than he, and then for several days pretended to have been himself the victim of an attack, until the bloody instrument was discovered which he had used, whereupon he confessed.

Another group of children banded together to pilfer churches, and one of them boasted of having robbed his accomplices. One child set fire to a village ; another lamented that people no longer ate human flesh. Another child, five years old, intelligent and wide-awake, seeing blood flow from his little brother's nose, knocked him off the chair and, plunging his hands in the blood, cried : "I want to kill this baby, I want to see his blood, I want nothing else." Asked whether he would be willing to kill his mother, he answered : "I can't just now, I shall wait till I am bigger." Another bright child, eleven years old, had struck and threatened a comrade, then he killed him with blows from a sickle, not stopping till tired out, then threw the body into a ditch, where he washed himself and pre-

tended that they had been attacked by a peasant and confessed only when he was promised immunity.

Cruelty was observed in the earliest youth of Caracalla, of Caligula, and of Commodus, who at thirteen had a slave thrown into a furnace for a trivial reason ; of Louis XI. and of Charles IX. who had animals tortured, and of Louis XIII. who crushed slowly between two stones the head of a little bird, and became so irritated against a gentleman whom he did not like, that to calm him down they had to pretend to kill the gentleman. When he became king he delighted to watch the agony of Protestants condemned to death.

Now these criminals are recognised even from their earliest days because they have extraordinary anomalies of the face and of the skull, asymmetry, macrocephaly, exaggeration of the length or breadth, strabismus, ears badly placed or too large, enormous jaws, bad conformation of the teeth, especially of the incisors, now too large, and again too far apart, nose flat and crooked, hair abundant on the forehead, an exaggerated development of the body (a child of seven having the stature and weight of one of nine), strength precocious, left-handedness more common, and above all great dulness of the senses. The sense of touch instead of marking one or two millimetres is so dull as to give four millimetres or more. The sensibility to pain is very slight. The sense of odors and colors is imperfectly developed.

There is then a criminal type, so that your intuition leads you unconsciously to shrink from a person who has the face of a thief, and I have heard the case of a woman who, a few days after the birth of a niece who afterwards became a great criminal, said on seeing her eyes, "She looks as if she were going to murder us all." Recently the notorious Craveri was loath to rent a room to a man who had made a sinister impression on her, and who afterwards killed her. I explain this fact scientifically, by maintaining that in the strata of our brain there must exist elements of the sensations experienced by our progenitors, sensations which are re-awakened as soon as the causes are re-presented which first awakened them.

And as in ancient times the wicked were the dominating op-

pressors and the good were the oppressed, though these latter have been emancipated in the course of time, there remain internal instincts which arouse aversion to those who present that totality of exterior signs which anthropological science has at last explained.

Now, these characteristics in the child are almost the same as in the adult rascal, and when the teacher sees a child that does something naughty and has none of these physical characteristics, reassure the family, because these phenomena will certainly disappear. On the other hand, when the characteristics are conspicuous and continue to be more and more prominent, and the misdeeds are more and more serious, the teacher ought to be on his guard. In these cases the ordinary education will not do. Theoretical ethics passes over these diseased brains, as oil does over marble, without penetrating it. It is necessary to use much more energetic means. Meanwhile see if epilepsy does not exist which can be cured by proper medicines, and try to invigorate or call into being the child's power of psychic inhibition, which in many cases is lacking, and that, not with words, but by good, well-chosen examples. A lad in a reform school at Paris complained to Father Maury of the excessive labor of digging a drain. The priest said nothing, but took the spade and began to work; from that day forth the lad was the model of his comrades.

It is worth while to study the inclinations which predominate in these individuals, in order to be able to direct them and guide them in a special direction. Above all, withdraw them from those fields in which their criminal activity would most develop, especially as they would infect the innocent, as rotten apples do sound ones, and hence particularly keep them away from the great cities and even from large towns, set them at work on isolated farms or as cabin-boys at sea.¹ When at last no measures will longer avail, and when vice has become crime, and habitual crime, procure their

¹ This is the reason that in England, and especially in London and in Geneva, crime has diminished—notably among minors, whilst it is constantly increasing in the other countries of Europe. But the benefactions in the way of preventing juvenile crimes are a hundredfold more numerous in England and Switzerland than in other countries.

isolation as if they were lunatics, so as to spare society a series of misfortunes, the family greater disgrace, and the judges an activity often useless. Human justice examines only fifty per cent. of those who become guilty, and of these does not punish twenty-five per cent., and punishes them inefficaciously, often sending them back, especially if young, to their wicked deeds, frequently several times a year. That is why crime triumphs every day, and all that we do serves only to aggravate it. And thus we suffer for the harm the criminal does us, and suffer for the expense of investigations to find him out and to convict him, without all this preventing us from being injured again by him in the near future.

If the teacher, by pointing out the future criminal, prevents his maturing in the bosom of society, he will do a holy work and one truly useful to humanity.

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ARRESTED MENTATION.

I DESIRE to call the attention of my readers to a psychological phenomenon, which is little known. The name by which I have designated it, may appear perhaps somewhat vague, but the considerations which I intend to advance, will, I hope, throw some light on it.

Neither the mind nor the senses of man serve him with absolute perfection. The eye often plays us false in reproducing the things and the phenomena of the outer world. For example, it shows us the moon as a small, luminous ball, whilst we know in reality that it is an immense body of matter revolving in space. We seem to see the sun revolving around the earth, though the contrary is an undoubted fact. In short, if the organ of vision be the source of a great part of our knowledge, it is also the source of a vast number of errors and wrong perceptions, which give rise to erroneous judgments or render exact judgments very difficult.

It is the same with the mind. The mind acts according to certain laws which lead us, according to circumstances, to truth, or to error. Error is sometimes the normal result of human reasoning and of the regular functioning of the mind according to the general laws of its activity. In such cases Truth is the exception. It is a perfected result which man has arrived at in his judgments by the correction of false conclusions, in the same manner that he indirectly corrects the false perceptions of his senses. Psychology hitherto has given little attention to the investigation of these organic defects of the human intellect, although it is the only study that furnishes us the key to a vast number of superstitions, errors, aberrations, and absurd beliefs prevalent in the human race.

Logic, as formulated by Aristotle and John Stuart Mill, is far from supplying the natural laws which govern mental action ; it sets forth instead, ideal rules, which, if closely followed, would in the end no doubt lead men to the discovery of the truth. Logicians like Aristotle and Stuart Mill study and analyse the corrective methods which lead our thought to the truth when the normal laws would lead it to error ; they point out how man *ought* to think in order to discover the truth, but they do not show how he actually does think in the majority of cases, in seeking to control his sentiments and conduct.

We are aware that one of the most important actions of the mind is that by which we arrive at the causes of phenomena. We also know that the idea of cause implies no other idea but that of a constant relation of succession between two facts ; to that second phenomenon which always follows the first phenomenon called *cause*, we give the name of *effect*. Let us now examine how the process of reasoning by which we discover causes differs, in the ideal logic of Aristotle and Stuart Mill, from the real logic which is commonly in use among men.

Let us take, for example, that method of discovering causes which Stuart Mill calls "the method of agreement." "Let *a* be the effect," writes Mill. "Here we have only the resource of observation without experiment ; we cannot take a phenomenon of which we know not the origin and try to find its mode of production by producing it ; if we succeeded in such a random trial, it could only be by accident. But if we can observe *a* in two different combinations *abc* and *ade*, and if we know or can discover that the antecedent circumstances in these cases were *ABC* and *ADE*, we may conclude that *A* is the antecedent connected with the consequent *a* by a law of causation. *B* and *C*, we may say, cannot be causes of *a*, since on its second occurrence they were not present ; nor are *D* and *E*, for they were not present on its first occurrence. *A*, alone of the five circumstances, was found among the antecedents of *a* in both instances. For example, let the effect *a* be crystallisation. We compare instances in which bodies are known to assume crystalline structure, but which have no other point of agree-

ment ; and we find them to have one, and as far as we can observe, only one, antecedent in common : the deposition of a solid matter from a liquid state, either a state of fusion or of solution. We conclude, therefore, that the solidification of a substance from a liquid state is an inevitable antecedent of its crystallisation.”¹

Such, according to John Stuart Mill, is the mental process employed in the discovery of the causes of phenomena. It consists in a rigorous and accurate examination of the facts which precede the phenomenon of which we seek the cause, upon the basis of which we extricate the facts which precede always and invariably, from those which occur only occasionally and by accident.

Note, however, that we are concerned here with that scientific, attentive, and exact mode of reasoning, in which man strives by unusual effort to guard himself against every possible chance of error, and not at all with the method that is employed by the vast majority of mankind. Scientific reasoning demands the exercise of attention. To put forth the severe mental effort there demanded, would be impossible for all men, in every act of thought. It is true that the capacity for attention is greater among civilised nations than among savages, but even with the former the average is not very high. The use of this faculty sooner or later brings with it such a sense of exhaustion and fatigue as to cause men to husband their mental effort or to bestow their attention only on those things which interest them very strongly. “Very few,” writes M. Ribot, “are those to whom attention is a necessity, and still fewer they who choose the *stantem oportet mori*.”

As a matter of fact, only a few of our ideas are the outcome of voluntary reflexion and concentrated attention ; the remainder are the product of associations which have been established unconsciously and gradually in our brains as the result of impressions from the things and phenomena of the surrounding world. Observe how the savage nations, incapable as they are, both of sustained attention and reflexion, have made practical use of so many of the forces of nature, without possessing even the most rudimentary

¹ J. S. Mill. *A System of Logic*. London, 1875. Vol. I., p. 469

knowledge of physics or chemistry. "If we mistake not," writes M. Espinas, "it would puzzle very seriously some of our scientific men to give the mechanical theory of the *boomerang*, that weapon which after having attained its aim returns to the person who threw it. It has taken long and continuous study to explain theoretically the chemical processes practised from time immemorial in the preparation of metals and in the productions of the wine press, the dairy, etc. Horticulture came before botany; and it was from the stock-breeders that Darwin borrowed his idea of natural selection—not they from him. In all ages practice has preceded theory. In other words, action has in all ages adapted itself to circumstances without the assistance of abstract thought." To-day even, by a simple glance at the atmosphere, the sailor unfailingly discovers the signs of fair or foul weather. The sportsman often knows more about the psychology of the horse than ever Mr. Romanes or M. Houseau, though neither have made any profound study of meteorology or psychology. The proverbs of nations, which are a compendium of the national experience and wisdom, often contain truths that have cost science years of laborious research to establish. M. Lombroso and I found epitomised in proverbs the fact of the greater longevity of woman, a law which it took statistics a long time to establish scientifically by tables and figures.

This particular species of reasoning, which we may call with M. Espinas *subconscious*, and in which neither attention nor reflexion has much share, has always been employed by men on a much larger scale than scientific reasoning, properly so called. It is based on the law of association. Spencer has demonstrated that the associability of certain states of consciousness is in proportion to the frequency with which they follow each other in experience. How, then, do we arrive in this subconscious form of reasoning at the discovery of the causes of facts? Let us suppose a case. The appearance of phenomenon *a* is sometimes preceded by the phenomena *ABC*, sometimes by *ADE*, at other times by *AFG*; and in all the series of phenomena preceding *a*, the presence of *A* is always noted; that is to say, in the experience of individuals, *A* is three times associated with *a*, whilst *BCDE* and so forth are only asso-

ciated with it once. It follows according to the law enunciated that the idea of a tends to recall the idea of the cause A , far more strongly than it does that of BCD and so forth, because of having been associated with A a greater number of times than with the others. Farmers know perfectly well that rain is more necessary to good crops than either wind or moonlight. Having noticed from generation to generation that certain atmospheric changes, such as rain, wind, or a long stretch of clear nights produce different effects, little by little a train of ideas has been unconsciously established in the brain, associating rain with fruitful harvests. In this way they come to the knowledge of the fact that rain is a cause of vegetation and that moonlight is not.

The law of mental associations, acting alone and independently of attention, has given to man the knowledge necessary for life;—a knowledge of innumerable facts and countless natural phenomena that science only subsequently explained.

It cannot be denied that this is the commonest form of reasoning; for science, being still a recent product, is as yet only the privilege of a very few. Moreover, subconscious reasoning is undoubtedly much less fatiguing than the other mode, which involves the fullest consciousness and attention. Now, since man, by the law of least effort, about which I have spoken in another place,¹ always puts forth in his work the least possible intellectual exertion, subconscious reasoning ought naturally to be preferred before the others. However, if left uncorrected by attention and reflexion, unconscious reasoning does not always lead man to the truth; for in certain cases error is the normal and regular issue of this form of reasoning.

Now, one of these laws of subconscious reasoning is that which I call *arrested mentation*. By it in certain cases the thought of man is led in its search for causes to commit a species of error which is the source of many of the false notions of primitive races, and is to-day even the occasion of many fallacies which pass as accepted truths.

¹See *Revue philosophique*, "L'inertie mentale et la loi du moindre effort," February, 1894.

Let us suppose that the phenomenon a is always preceded by the phenomenon A , and that A is always preceded by B . The ulterior cause of a , then, is B ; and the scientist investigating a , would not stop at A , but would push on his researches to B . Let us suppose, further, that A is of such a nature as to be apprehended by the senses, say of sight and hearing, and that B cannot be perceived by the senses, but is invisible, intangible, etc.; it follows that B produces no sensations, and although it is necessary for the production of a , still its presence cannot be detected except by attentive observation, comparison, reflexion, and analysis of facts; that is, by the employment of one of Mill's four methods for the discovery of causes. Now, subconscious reasoning is carried on by the association of states of consciousness produced in our minds by *sensations*; and B not producing sensations will be excluded from the associative series. In other words, in this mode of reasoning A will be considered as the ulterior cause of a , and B will remain utterly ignored. The train of thought is arrested at A ; that is to say, it stops short at facts falling under the notice of the senses.

This theory well explains the genesis of a vast number of erroneous notions universally accepted as truths by primitive peoples, and sanctioned also by civilised persons ignorant of science or scientific methods. Some of the tribes in Australia have been known to pray to the white man's gun not to shoot them, for they believed it was the gun itself, without the co-operation of man, that produced the murderous fire. Certain barbarous tribes entertain an absolute veneration for the art of writing. The North American Indians believe a written paper cannot lie, and they regard a letter of recommendation as a great prize, purely for its own sake and not at all for its contents. The blacks in Congo believe that paper and writing are spirits capable of speech, and whenever a European sends a letter by a native to any one, if the latter should loiter or stop to amuse himself by the way, he never fails to hide it under a stone, for fear it should reveal his delinquency to either the sender or the recipient. In Annam the French unwittingly provoked a rising of the natives by tearing up some written papers which were regarded as sacred by them.

Whence comes this exaggerated importance accorded by savage man to the fire-arms and handwriting of the Europeans? It is the result of the psychological phenomenon named by me arrested mentation. The savages observe that the European, by looking at certain signs and figures traced on a sheet of paper, is put in possession of the thoughts or the commands of another person, dwelling a great distance off, perhaps hundreds of miles away. This fact fills him with such astonishment that he is capable of but two sensations or impressions. He perceives that the reader has grasped the ideas of the other person, and that this fact happened after the signs on the paper had been scrutinised. These two events occurring always in succession become coupled together in his brain, and he concludes that it was the paper that spoke and revealed the thoughts of the absent person. He can neither estimate nor understand the whole complex series of associations connecting the written signs with their representative sounds, which is the essence of written language, and the vehicle by which we convey our thoughts to others. In order to understand this, the savage would have to possess the requisite knowledge of the importance and meaning of writing and the part those signs and images play in expressing and conveying thought. He cannot do this, but simply falls back upon the impressions caused by the writing and the effect it had on the reader. He connects these two facts and attributes to the paper what in reality is only the effect of a series of very complex associations established in our brains between the sight of certain signs and the images of certain sounds; and he finally concludes that a written paper is something supernatural and endowed with mysterious powers. It is the same with fire-arms, for the savage mind has great difficulty in understanding their mechanism.

Now is this error in the search for causes confined solely to uncivilised man? No. On the contrary it is to be met with in all the reasoning of those, who, though civilised, have not had the advantages of a higher education—in fine, in the reasonings of the great mass of the people. Let us glance for a moment at the legends connected with books. The common people, when they find any one with more than the usual amount of education and apparently better

informed than his fellows, always attribute this mental superiority to the possession of books, from which this greater knowledge has been acquired. According to the Chinese popular belief, Fo-Hi, a saint and legislator, saw the laws which he gave his people, written on the back of a serpent. In the Koran this theory of the book applied to superior men is very noticeable. God sends a book from Heaven in which His will is found written—the Pentateuch, the Gospel, the Koran. Thus we read (Book VI., Verse 19): “Every age has its book;” (Book XIX., Verse 13) “the prophets have theirs.” God says to John the Baptist (Book XIX., Verse 31): “Take this book (the Pentateuch);” and the new born Jesus says to the family of His mother: “I am sent by God, He has given me His book.” “O true believer,” cries the prophet (Book IV., Verse 135), “believe in God, and in his apostle, believe in the book which He has sent and in the Scriptures that descended to earth before him.”

This superstition about books is clearly explained by the theory of arrested mentation. The average man observes that persons of high mental attainments, physicians, lawyers, and others, possess a great many books which they often read. These, as well as all other distinguishing marks of the educated man, such as learned speeches, etc., are the only tangible evidence which his senses impart to him of their superior knowledge. Accordingly, he puts the two ideas together and comes to the conclusion that it is the book that has made the scholar. Here also the reasoning has stopped half way, for books are merely the means of communicating ideas, while in order to be a superior man, one must be able to create ideas. Nothing of all this, however, enters into the associations of the average man, who is limited to the reports of his senses for his knowledge. Accordingly, he concludes that it is through the possession of books and not by the power of genius that the learned man has become the superior of his fellows.

Arrested mentation explains also that exaggerated respect which man has always had for the instruments that assist him in his struggle for existence, attributing to them the success of his labors, whilst

in reality that success depends as much on the ability of the man who wields the instrument as on the instrument itself.

Generally speaking the military power of countries is gauged by the number of horses, guns, cannons, and soldiers which each possesses, without taking into consideration that soldiers and weapons are merely instruments which can be made use of only if well handled, and that their number is subordinate to their effective use; for in the hands of a bad marksman a Remington even, may be less dangerous than the arrow of the savage. Here again arrested mentation comes into play.

It will be remembered that in the early days of the introduction of machinery into manufactories, riots broke out among the mill-hands. The reduction of wages and of labor was attributed to the use of these machines. But this was really caused by certain complications in the social economy of the time and was not at all the result of the introduction of machines. The working-classes, however, observing that these troubles always fell upon them immediately after the introduction of the machines, associated those two facts of which they had immediate knowledge and declared that the use of machinery was the immediate cause of reduced wages and scarcity of work, being ignorant of those economical complications which were the real though invisible causes of their distresses and which could only be discovered by dint of reflexion and a careful analysis of facts. Here again we have a case of arrested mentation.

A similar delusion existed in olden times with regard to gold and is still to be met with to-day among people ignorant of the principles of political economy. Gold in the opinion of such persons was wealth, while in reality it is merely the means whereby we estimate wealth, the actual source of which is labor. It was observed that those who possessed much gold were able to procure everything they desired. These two facts given by the immediate experience of the senses became associated in the minds of the greater portion of mankind, who never took into consideration the fact that all the precious metals in the world would be practically useless if nobody took the trouble to produce by means of labor the wealth which is measured in exchange by gold. The economic relations between

money, wealth, and production can only be understood by abstract thought, and for this reason, they are neglected in subconscious ratiocination. Thus, Spain in the sixteenth century based her whole system of political economy on the acquisition of gold and on idleness ; while she thought to enrich herself without exertion, she found herself in a very short time reduced to poverty.

Arrested mentation then is a real law of the mind, and a positive one, so to speak, for we have seen that it plays a most important part in much of human reasoning. Since it is this subconscious form of reasoning rather than the scientific form that is more commonly used, the preceding reflexions assume the status of a psychical law asserting that in the analysis of a series of phenomena with which another phenomenon is connected by a law of causality, human thought is arrested at the phenomena which produce the sensations and which are revealed directly to the senses, and neglects those that can only be discovered by reflexion and comparison. It is a defect of the mind, an organic defect, which logic seeks to remedy by a study of the methods of avoiding false conclusions.

So true is this that even scientific thinkers are occasionally subject to arrested mentation with regard to phenomena which are not the subject of their habitual researches. An eminent chemist still believes that gold is the wealth of nations ; a social economist thinks that the military power of a government is augmented by the increased number of guns and of forts. In Italy men of science attribute the inferiority of Italian scientific discoveries to the poverty of the laboratories and the inefficiency of their instruments, failing to perceive that a genius can make great discoveries even without possessing very perfect or numerous instruments. For, to quote the words of a German naturalist about the microscope—"It is the eye and the brain of the scientist that makes the discovery, not the microscope."

Here we perceive the possibility of a new science—positive logic—which would make a study of the laws of human reason, according to age, the degree of intellectual development, and the state of civilisation. It is not true that logic is always one and the same ; it varies, like all other human things, according to the age,

the degree of intelligence, and the development of the brain. As it is a brain-function, it follows the variations of that organ. A child, a savage, makes use of modes of reasoning very different from those of an advanced thinker. The brain of a child or of a savage differs sensibly from the brain of a Newton or a Darwin. In the logic of Stuart Mill or Aristotle the *post hoc ergo propter hoc* is a heresy, yet it is the normal method used by children, savages, and the lower classes even to-day. It is said of Stephenson, that while watching one of his own trains carried along by a locomotive, he exclaimed : "It is the sun that moves all that." But if it is quite natural that a scientific man like Stephenson should perceive the sun to be the last cause of the motions of trains, it is also normal and in the regular order of things that an ordinary man with but little instruction should attribute that motion to the engine preceding the cars. The reasoning of the one stops short at this point, while the mind of the other, embracing an immense number of facts, links them all together into a marvellous synthesis.

I have examined but one law of this positive logic, the law of arrested mentation, but I do not doubt that in extending our researches we could find many more. We do not yet understand the mode of reasoning of the savage, of the average civilised man, or of the child ; this is why so many ideas, superstitions, beliefs, usages, and customs astonish us and appear so inexplicable, while the key to all of them might be found in a complete psychology of human reasoning.

* * *

In this species of arrested mentation observation stops half way; it is arrested at the facts which fall under the notice of the senses. But arrested mentation can occur in still another way, involving the total abolition of observation.

As is known, one of the gravest faults of the mind has always been a penchant for the exclusive use of pure logic and deductive reasoning. In this century of experimental science, nothing appears more simple and elementary than the study of the phenomena of nature and its laws by observing facts and drawing conclusions from observation. This procedure appears so natural that it seems

impossible to believe that any one could have ever supposed he could make the acquaintance of the facts of nature in any other way. But the history of science shows that the method of observation and the method of experiment were difficult conquests and only recently completely mastered. Formerly nothing was employed but pure reason without the slightest observation of facts; logic usurped the place of experiment, and all science began by the use of the deductive method. As Lange has remarked, even the materialistic schools, the very nature of whose studies kept them in close contact with nature, reasoned in this way. Physics and chemistry in their early days consisted merely of a series of deductions drawn by the aid of logic from a principle which was the fruit of some real or imaginary observation; and it was only later that men began to perceive that in order to understand natural laws correctly they must observe more and reason less. In fact, logic, which in the method of experiment and observation is only the psychological instrument with which we work upon facts in order to discover truth, the crucible by which we extract from the ore of observation the gold of truth,—this same logic was in the origin of science the source of truth, the philosopher's stone which could create gold. Now, I maintain that this abuse of deduction is the result of arrested mentation produced by definite causes; that it is a lower form of human reasoning, like the species of arrested mentation studied above—all of which would explain the commonness and diffusion of its use.

The form of arrested mentation which we have just been considering was due to the tendency in man to escape from the effort of attention and conscious thought. He prefers to use the subconscious form, which is not so severe a tax on his brain. I have elsewhere attempted to demonstrate that the mind always seeks to employ the psychological processes which demand the least expenditure of mental labor and are the least fatiguing. This I have called *the law of least effort*. All labor involves a waste of tissues, and it becomes painful in proportion to their weakness. Now, brain-work appears to create a sense of discomfort in the great majority of men who seek to reduce as much as possible the intensity of it by putting forth always the least possible effort. Keeping this

in mind, we can easily understand why the *à priori* method is generally preferred to the *à posteriori*, with its experimental and practical observations; it is because the former mental operation is far more simple and less fatiguing than the latter, and involves less complex and multitudinous elements. In order to deduce a definite conclusion or law from the observation of a large number of facts, the mind must keep before it the images or ideas of all those facts, also the idea of their differences and their resemblances (which presupposes very complex relations between the ideas of the facts); further, for all or for many of the facts the idea of the conditions under which they are produced, and the idea of their relations with other conditions in which they are not produced. We see then that the mental operation by which we arrive at a definite conclusion if it starts from a positive observation of facts, is extremely complex and always implies the presence in the mind of a considerable number of elements.

But to draw a conclusion from a premise requires simply a syllogism, that is to say, a mere chain of ideas, from which are excluded all those collateral associations which constitute the complexity of the first form of reasoning. We need only keep clearly in mind the premises from which we draw a conclusion; consequently, the number of the states of consciousness are enormously lessened, even supposing these conclusions to become in their turn premises from which ulterior conclusions are drawn, for there are never more than two states of consciousness present to the mind, while the first even may be forgotten, as soon as its conclusion begins to assume the rôle of the premise to some final conclusion. In short, the advantage in favor of purely deductive reasoning is this, that there is no need to keep present to the mind anything except the premise and the conclusion, whilst in the other form we must grasp an infinity of ideas, with their perplexing relationships, as facts forming the basis of the conclusion, and these oftentimes are exceedingly numerous and diverse.

To give a rough idea of the widely different complexity of the two modes of reasoning, I will offer here a sketch of the states of consciousness which are present in both.

If we call $a, b, c, \dots z$ the states of consciousness produced by the observation of the facts, $+a', +a'',$ etc., and $+b', +b'',$ etc., the ideas of the conditions under which $a, b, c,$ etc. respectively present themselves; $-a', -a'',$ and $-b', -b'',$ the ideas of the conditions under which they do not present themselves; if we call, further, $+\alpha, +\beta, +\gamma,$ the ideas of the resemblances, and $-\alpha, -\beta, -\gamma,$ the idea of the differences between $a, b, c,$ the following table will perhaps give some notion of the complexity of the mental operation:

$-a' - a'' - a''' \dots - a^n$	$-b' - b'' - b''' \dots - b^n$	$-c' - c'' - c''' \dots - c^n$	$-z' - z'' - z''' \dots - z^n$
$+a' + a'' + a''' \dots + a^n$	$+b' + b'' + b''' \dots + b^n$	$+c' + c'' + c''' \dots + c^n$	$+z' + z'' + z''' \dots + z^n$
$\underbrace{\hspace{10em}}_a$	$\underbrace{\hspace{10em}}_b$	$\underbrace{\hspace{10em}}_c$	$\underbrace{\hspace{10em}}_z$
$+\alpha$		$+\beta$	$+\gamma$
$-\alpha$		$-\beta$	$-\gamma$

We perceive, thus, how numerous are the mental elements actively employed in carrying us from an observation of facts to a scientific conclusion. Of course all these are not always present at the same time; they follow each other in quick succession and in groups of different combinations, but the mental operation is always complex.

In the deductive method, on the contrary, if we call the first premise A , and indicate conclusions by the smaller letters, using capitals for those same conclusions, after they also have become premises, we shall have:

A
 b
 B
 c
 C
 d .

No matter how complex A, B, C are, even if composed of different states of consciousness, it is quite evident that this mental operation is much simpler. There are no collateral relationships, for when conclusion b , begins to act as premise B , A can be absolutely forgotten.

It is now plain to us why men prefer deductive reasoning; being as it is, psychologically simpler and much less fatiguing than

the other. The less exercise the mind has in the one, the more it contracts the habit of using the easier process of thought, and the more incapable it becomes of using the difficult. Arrested mentation ensues. The mind stops at the relations between premises and conclusions, they being the only ideas that occupy its consciousness, all collateral associations being excluded. Little by little the mind becomes incapable of admitting other states of consciousness between the premises and the conclusions, even if such should be suggested by the sensations, because they complicate the relations. The mind shuts itself up, it sees nothing beyond the premise and the conclusion, no possible objections, nor any absolutely contrary facts. This explains why the clearest and most forcible demonstrations have no weight at all with excessively deductive minds. Harvey has shown this clearly in the history of his struggles in defence of his theory of the circulation of the blood. According to the old accepted belief, founded on a series of *à priori* reasons and on Aristotle's teaching, it was asserted that a certain opening was to be found in the heart. Harvey in many discussions and by ocular demonstration showed that this opening did not exist. This proof, which should have completely satisfied his opponents, had no effect at all upon them, so he had to be contented with asserting that though this opening did not exist in ordinary hearts, it might possibly have been found in Aristotle. Here, the reasoning was so closely confined to the premise and the deduction, that all collateral and relative ideas by which observation and logic might have modified the absolute character of the deductive inference, became impossible. The mind of these persons had been so accustomed to purely logical reasoning, which involves far less strain, that they had become incapable of any other form demanding a greater expenditure of energy. It was impossible for them to admit other elements to their habitual states of consciousness, even such as were suggested by their senses, and which, if admitted, would have led them to the true conclusion.

So we can understand why this abuse of pure logic and deductive reasoning has been in all ages a defect of thinking men, and why even to-day in spite of the tendency to experimental observa-

tion, which is continually gaining ground, we must still strive to prevent science from falling back on *à priori* proofs and pure deduction. It is because this form is more convenient and less fatiguing and ends in a mental arrest, by which the intellectual labor is simplified ; because it is a lower type of thought like the subconscious form, of which we have already spoken.

All reasoning, on the other hand, which is based on observation is far superior, more recent, less common, more complex, more fatiguing, but bears results which are vastly more extensive. More truths have been discovered in three centuries by the experimental method than could have been ascertained in a hundred centuries by mere deductions and the use of the *à priori* philosophy, which is nothing but a gigantic arrest of thought, under the sway of which mankind has lived for ages.

The analysis of the psychological process of arrested mentation explains both its genesis and its persistence.

G. FERRERO.

TURIN, ITALY.

NATURALISM.

IN ONE of the most remarkable books of modern times—a work of rare literary excellence and, as it seems to me, transparent honesty of purpose—Mr. Balfour has weighed naturalism in the balance and found it wanting. Naturalism, however, is not at present blessed (or the reverse) with a stereotyped creed; it is rather a point of view or mental attitude; and those who adopt this attitude have been led to conclusions which are in many respects markedly divergent. There may be some whose naturalism tallies in all essential respects with that which Mr. Balfour has placed in one of the scales of his balance; but there are others who fail to recognise this naturalism as theirs; who believe that Mr. Balfour has failed in certain important matters to give to the conclusions of naturalism their due value; and who contend that, had he in these matters weighed what they regard as the substance, and not merely the shadow, the result of the process would have been different.

“The leading doctrines of naturalism are,” we read,¹ “that we may know ‘phenomena’ and the laws by which they are connected, but nothing more. ‘More’ there may or may not be; but if it exists we can never apprehend it: and whatever the world may be ‘in its reality’ (supposing such an expression to be otherwise than meaningless), the world for us, the world with which alone we are concerned, or of which alone we can have any cognisance, is that world which is revealed to us through perception, and which is the subject-matter of the natural sciences. Here, and here only, are we on firm ground. Here, and here only, can we discover anything which

¹ *Foundations of Belief*, p. 7.

deserves to be described as knowledge. Here, and here only, may we profitably exercise our reason or gather the fruits of wisdom."

Now in this definition of naturalism (especially having regard to the foot-note-description of phenomena as "roughly speaking, things and events, the general subject-matter of natural science"), it would seem at first sight that mental products and processes were to be regarded as wholly outside its sphere. But this is clearly not Mr. Balfour's intention. For one of the main theses which he seeks to uphold is that naturalism fails to give an adequate account of the developed consciousness in man. Special chapters are devoted to ethics, æsthetic, and reason in their relations to naturalism, the inadequacy of which to give a satisfactory account of our ideals of right, of beauty, and of truth, is set forth in eloquent language the fervor of which indicates the strength of the author's conviction. "It is hard to see," we are told,¹ "on the naturalistic hypothesis, whence any one of these various natural agents is to derive a dignity or a consideration not shared by all the others, why morality should be put above appetite or reason above pleasure." "My point is," says Mr. Balfour,² "that in the case of those holding the naturalistic creed the [moral] sentiments and the [naturalistic] creed are antagonistic; and that the more clearly the creed is grasped, the more thoroughly the intellect is saturated with its essential teaching, the more certain are the sentiments thus violently and unnaturally associated with it to languish or to die." Taking naturalism as our guiding principle "we can," he insists,³ "hardly doubt that the august sentiments which cling to the ideas of duty and sacrifice are nothing better than a device of nature to trick us into the performance of altruistic actions." "Kant,⁴ as we all know, compared the moral law to the starry heavens, and found them both sublime. It would, on the naturalistic hypothesis, be more appropriate to compare it to the protective blotches on the beetle's back, and to find them both ingenious."

¹P. 15.

²P. 15.

³P. 16.

⁴P. 10.

Mr. Balfour then proceeds to consider the "sentiments known as æsthetic ; and just as I assumed," he says,¹ "that the former class [of moral sentiments] were, like other evolutionary utilities, in the main produced by the normal operation of selection, so I now assume that the latter, being (at least in any developed stage) quite useless for the perfection of the individual or species, must be regarded, upon the naturalistic hypothesis, as mere by-products of the great machinery by which organic life is varied and sustained." No person," Mr. Balfour further assumes,² "who is at all in sympathy with the naturalistic view of things would maintain that there anywhere exists an intrinsic and essential quality of beauty, independent of the feelings and the taste of the observer." "And yet³ the persistent and almost pathetic endeavors of æsthetic theory to show that the beautiful is a necessary and unchanging element in the general scheme of things, if they prove nothing else, may at least convince us that mankind will not easily reconcile themselves to the view which the naturalistic theory of the world would seemingly compel them to accept." "We must believe that somewhere and for some being there shines an unchanging splendor of beauty, of which in nature and art we see, each of us from our own standpoint, only passing gleams and stray reflexions, whose different aspects we cannot now co-ordinate, whose import we cannot fully comprehend, but which at least is something other than the chance play of subjective sensibility or the far-off echo of ancestral lusts."

Turning now to the rational faculties there is, for naturalism, Mr. Balfour imagines,⁴ "no distinction to be drawn between the development of reason and that of any other faculty, physiological or psychical, by which the interests of the individual or the race are promoted. From the humblest form of nervous irritation at the one end of the scale, to the reasoning capacity of the most advanced

¹ P. 33.

² P. 42.

³ P. 64.

⁴ P. 68.

races at the other, everything without exception—sensation, instinct, desire, volition—has been produced directly or indirectly, by natural causes acting for the most part on strictly utilitarian principles. Convenience, not knowledge, therefore, has been the main end to which this process has tended.” “Reason,¹ on the naturalistic theory, occupies no elevated or permanent position in the hierarchy of phenomena. It is not the final result of a great process, the roof and crown of things, on the contrary, it is, as I have said, no more than one of many experiments for increasing our chance of survival, and, among these, by no means the most important or the most enduring.” Regarding mind as, from the point of view of organic evolution, an inherited faculty for self-adjustment,² Mr. Balfour reminds us that even here “one of the principal functions of mind is to create habits by which, when they are fully formed, it is itself supplanted. If the conscious adaptation of means to ends was always necessary in order to perform even those few functions for the first performance of which conscious adaptation was originally required, life would be frittered away in doing badly, but with deliberation, some small fraction of that which we now do well without any deliberation at all.” And so we are led to the general conclusion that³ if naturalism be true, or, rather, if it be the whole truth, then is morality but a bare catalogue of utilitarian precepts; beauty but the chance occasion of a passing pleasure; reason but the dim passage from one set of unthinking habits to another. “All that gives dignity to life,” exclaims Mr. Balfour, “all that gives value to effort, shrinks and fades under the pitiless glare of a creed like this; and even curiosity, the hardest among the nobler passions of the soul, must languish under the conviction that neither for this generation nor for any that come after it, neither in this life nor in another, will the tie be wholly loosened by which reason, not less than appetite, is held in hereditary bondage to the service of our material needs.” “If, then,⁴ naturalism is to hold the field, the

¹P. 72.

²P. 73.

³P. 77.

⁴P. 81.

feelings and opinions inconsistent with naturalism must be foredoomed to suffer change; and how, when that change shall come about, it can do otherwise than eat all nobility out of our conception of conduct and all worth out of our conception of life," Mr. Balfour is "wholly unable to understand"; while with regard to "those persons who claim to show by their example that naturalism is practically consistent with the maintenance of ethical ideals with which naturalism has no natural affinity," he contends¹ that "their spiritual life is parasitic; it is sheltered by convictions which belong, not to them, but to the society of which they form a part; it is nourished by processes in which they take no share. And when those convictions decay, and those processes come to an end, the alien life which they have maintained can scarce be expected to outlast them."

Such in brief outline,—for we need not follow Mr. Balfour into his catechism of the future,—is the argument for the inadequacy of naturalism in the ethical, æsthetic, and rational fields.

✓ We may, perhaps, sum up the argument under four heads.

1. Natural selection, the dominant factor in organic evolution, cannot adequately account for the development of human ideals of right or beauty, nor for man's intellectual powers and achievements.

2. No other naturalistic interpretation of ethical, æsthetic, or intellectual phenomena, as presented in human development, is possible or worth consideration.

3. Any naturalistic interpretation of these phenomena would rob them of their worth and dignity.

4. Those who contend that their worth and dignity is intrinsic, whatever may be their extrinsic origin, cheat themselves in a vain delusion; and while they merely echo the sentiments of others, fancifully claim the sentiments as their own.

Now, with regard to the opinion expressed in the first of these four heads, I am in the main at one with Mr. Balfour. I agree with him that natural selection (if I rightly interpret him, as, in this part

¹P. 83.

of his work, identifying naturalism with natural selection) cannot adequately account for more than the foundation of, certainly not for the final development of man's ideals of right or beauty, nor for the growth of human knowledge. But in the assumption that no other naturalistic interpretation of ethical, æsthetic, or intellectual phenomena is possible, I am in distinct and direct antagonism. It is true that Mr. Balfour does not formulate this assumption nor give it explicit statement, but we seem forced to conclude from his silence on the matter either that, in his opinion, there is no such interpretation in the field, or that no such interpretation is worthy of consideration.

I trust that I am not misinterpreting Mr. Balfour in saying that he here identifies naturalism with natural selection. The moral sentiments are, he says, to be compared on naturalistic principles to the protective blotches on the beetle's back,—a phrase which has been hailed with delighted acquiescence by those who sympathise with his dialectic. Æsthetic sentiments are mere by-products of the great machinery by which organic life is varied and sustained. Reason is no more than one of the many experiments for increasing our chance of survival. Throughout the discussion Mr. Balfour appears to assume that naturalism, in dealing with the products of social evolution, has come in sight of no principles other than those which are factors in organic evolution. Mind, he says, from the point of view of organic evolution, may be considered as an inherited faculty for self-adjustment; and to this we may add that from the point of view of social evolution, mind may still be considered as continually self-adjusting. But there is this important distinction, that whereas in organic evolution the mental faculties are subservient to the preservation of the organism in self-adjustment to an environment essentially physical and organic, when we come to the mental evolution of man as a social being the organism is made subservient to the development of mind in self-adjustment to an environment of ideas and ideals.

For this cannot be too emphatically insisted on: that natural selection deals with organisms, and that its method is that of elimination, if not from the world of living things, at least from the world

of breeding things. Natural selection only affects the development of mind and consciousness incidentally—that is to say, in so far as mind conduces to organic evolution. In social evolution among human beings, natural selection ceases to be the dominant method of evolutionary progress; and mental evolution, *involving other principles, not less natural than those which the study of organic development has disclosed*, becomes the central feature of the process.

We must extend our conception of naturalism so as to include a naturalistic interpretation of nature in all its wealth of moods, neither excluding inorganic nature on the one hand nor human nature on the other hand. If the leading doctrines of naturalism are that we may know phenomena and the laws by which they are connected; if for naturalism the world with which alone we are concerned and of which alone we have any cognisance, is that world which is revealed to us through perception, and which is the subject-matter of the natural science; we must include under the head of phenomena the loftiest ideals which the human mind has reached, and rank among the natural sciences ethics and æsthetics. These are the claims of naturalism. Whether they can be fully substantiated or not is a matter for the future rather than for the present to decide. But in any case the proof, no matter how cogent and how eloquent, that natural selection is incapable of adequately accounting for Raphael or Shakespeare or Darwin, is about as apposite as the proof that the known laws of crystallisation are incapable of affording an adequate explanation of the buttercup or the daisy.

Nor is it necessary that naturalism, in order to justify its claims, should be able to give a complete and adequate explanation of the universe. To the naturalist with all his arrogance there still remain, it is to be hoped, some few shreds of intellectual modesty. And he may fairly claim as much indulgence as Mr. Balfour himself claims for his suggestions towards a provisional philosophy, “It is evident, of course,” he may say,¹ “that this general view [of naturalism], if we are fortunate enough to reach it, will not be of the nature of a complete or adequate philosophy. The unification of all belief into

¹Pp. 233-234.

an ordered whole, compacted into one coherent structure under the stress of reason, is an ideal which we can never abandon ; but it is also one which, in the present condition of our knowledge, perhaps even of our faculties, we seem incapable of attaining. For the moment we must content ourselves with something less than this. The best system we can hope to construct will suffer from gaps and rents, from loose ends and ragged edges. It does not, however, follow from this that it will be without a high degree of value ; and whether valuable or worthless, it may at least represent the best within our reach."

That a naturalistic interpretation of man's ethical and æsthetic ideals tends in any degree to rob them of their worth and dignity appears to be false in fact. I, for one, should be sorry to believe that the noble deed, the unselfish action, the lofty ideal have no intrinsic worth and dignity but shine only with a borrowed lustre, no matter what the source of that lustre. Any creed which tends on the one hand to rob man of his inherent dignity, or on the other hand, to attribute his vices to diabolic agency, degrades him from the position of a responsible being and makes him a mere puppet over whom the gods meanly quarrel. And if it be asserted that the naturalist's conceptions of the worth of human endeavor are the spurious heritage of a creed that is not his, the counter-assertion may be made with at least equal plausibility, that the dignity of their supposed extrinsic source is but the reflected and hypostatized glory of their own inherent nobility.

I would not, however, for one moment be supposed to contend that naturalism, as I conceive it, is necessarily either antagonistic to or exclusive of supernaturalism, regarded as a product of human idealism. The "reconciliation" between naturalism and supernaturalism, to use a current but by no means satisfactory phrase, is not to be found in any more or less arbitrary separation of the natural and the supernatural but in the identification of the one with the other, and in the recognition on either part of the fact that there is no minutest detail of the natural that has not, or may not have, for man as poet, seer, and idealist, a supernatural aspect. The natural, we are often told, leads up to the supernatural at the utmost

and ultimate verge of scientific analysis ; beyond the ever-widening oasis of scientific knowledge, say others, lies the circumambient desert of agnosticism. The truer view is that the sphere of naturalism is throughout its whole extent and in every detail, no matter how seemingly insignificant, interpenetrated with supernaturalism. And this supernaturalism is not something separate from the phenomena which it is the business of science to investigate, but their inner and deeper aspect which it is the function of philosophy and religion to harmonise. On this view naturalism and supernaturalism are not antagonistic, but reciprocal ; do not dwell apart but are coextensive ; do not deal with separate spheres, the one knowable and the other unknowable, but constitute the diverse aspects of that body of belief which is the outcome of human experience at its best.

We now reach a point of view from which our differences from Mr. Balfour may be more closely seen and indicated. We are prepared to sweep the curve of naturalism through the whole range of the knowable, not imagining that the naturalistic interpretation of the universe is at present in any degree adequate or final, but accepting it as a provisional system of great promise. In doing this we are far from denying the existence or the all-pervading influence of the supernatural ; nay, rather we are laying firmly the foundations of a belief based not on rationalism, but on idealism. We contend for the natural and intrinsic nobility of man at his best and highest, and see therein the foundations of his religious ideals.

There is, however, another point of view from which we must consider the claims of naturalism ; and here again we will take the criticisms of Mr. Balfour as our starting-point.

In his chapter on the "Philosophic Basis of Naturalism" he skilfully plucks naturalism of its feathers and then, standing aside, genially encourages us to laugh at the poor, naked thing's efforts at flight as he tosses it up into the thin air of scepticism. Or, to vary the analogy, we may say without injustice that by a little ingenious mixture of the results of physical analysis with some of the conclusions of psychological analysis he produces a dish so nauseous and indigestible that even the general reader, who can swallow most

things, wonders how naturalism can contrive to eke out a lean and meagre existence on such hopelessly innutritious provender.

In the preceding part of Mr. Balfour's work we are prepared for what is to follow by the assertion¹ that "naturalism (as commonly held) is deeply committed to the distinction between the *primary* and the *secondary* qualities of matter; the former (extension, solidity, and so forth) being supposed to exist as they are perceived, while the latter (such as sound and color) are due to the action of the primary qualities upon the sentient organism, and apart from the sentient organism have no independent being." "We are dealing, recollect," says Mr. Balfour,² in his further development of the subject, "with a theory of science according to which the ultimate stress of scientific proof is thrown wholly upon our immediate experience of objects. But nine-tenths of our immediate experiences of objects are visual; and all visual experiences, without exception, are, according to science, erroneous. As everybody knows, color is not a property of the thing seen: it is a sensation produced in us by that thing. The thing itself consists of uncolored particles, which become visible solely in consequence of their power of either producing or reflecting etherial undulations. The degrees of brightness and the qualities of color perceived in the thing, and in virtue of which alone any visual perception of the thing is possible, are, therefore, according to optics, no part of its reality, but are merely feelings produced in the mind of the percipient by the complex movements of material molecules, possessing mass and extension, but to which it is not only incorrect but unmeaning to attribute either brightness or color." And again,³ "When I am in the act of experiencing a tree in the next field, what on this theory I am really doing is inferring from the fact of my having certain feelings the existence of a cause having qualities adequate to produce them. It is true that the process of inference is so rapid and habitual that we are unconscious of performing it. It is also true that the inference

¹P. 42.

²Pp. 111, 112.

³Pp. 114, 115.

is quite differently performed by the natural man in his natural moments and the scientific man in his scientific moments. For, whereas the natural man infers the existence of a material object which in all respects resembles his idea of it, the scientific man knows very well that the material object only resembles his ideas of it in certain particulars,—extension, solidity, and so forth,—and that in respect of such attributes as color and illumination there is no resemblance at all. Nevertheless, in all cases, whether there be resemblance between them or not, the material fact is a conclusion from the mental fact, with which last alone we can be said to be, so to speak, in any immediate empirical relation.” No wonder that Mr. Balfour is “struck by the incongruity of a scheme of belief whose premises are wholly derived from witnesses admittedly untrustworthy, yet which is unable to supply any criterion, other than the evidence of these witnesses themselves, by which the character of their evidence can in any given case be determined.” “In other words,” he says a little later, “we need only to consider carefully our perceptions regarded as psychological results, in order to see that, regarded as sources of information, they are not merely occasionally inaccurate, but habitually mendacious,” though on his own presentation of the naturalistic position, this habitual mendacity would seem to affect only the secondary and not the primary qualities.

What answer will be made to Mr. Balfour by those naturalists, if such there be, who accept the halting analysis into primary and secondary qualities, I am not in a position to judge. “Let the galled jade wince, our withers are unwrung.” It will be more to the purpose to state, as clearly as may be and without unnecessary technicalities, the truly naturalistic attitude, as I conceive it. Above all things it behooves us to stick close to the realities that are given in practical experience; and to remember that every step in analysis takes us so much further from the reality from which we start. The tree in the next field is for us who see it just as real a bit of practical experience as we can possibly have. And if a physicist on our right hand says that he has spent a lifetime in submitting trees to physical analysis, and that he can inform us that the tree is nothing but matter and energy; while a psychologist on our left hand

assures us that had his friend the physicist been more profitably employed, he would long ago have discovered that the tree is nothing but sensations and the relations between them combined in subtle synthesis; we may reply to them both that, profoundly interested as we are in the analytical results to which they have been led in the prosecution of their special studies, they have, in neither case, affected in the smallest degree the reality of the tree that stands before us in the field. Were some chemist to take from our dessert-plate a ripe and luscious peach, and hand us instead a few grains of carbon and some cubic feet of sampled gases, telling us that these were the ultimate realities of which the fruit consisted, should we not ask him to retire to his laboratory and try to learn this lesson—that in no case can the results of analysis have a reality superior to or more valid than that the destruction of which had yielded these elements? helping ourselves meanwhile to another ripe peach and realising to the full its velvet skin, its rich color, its scent and sweetness. There is perhaps no philosophic cobweb that has caught more unwary human flies than this doctrine that the products of analysis have somehow a reality superior to that from which they are extracted; that the trembling of molecules or vibrations of the ether are more real than the Kreutzer Sonata; that the extension and solidity of the rose-bud are more real than its scent and color; that sensations of smell or taste are more real than the aroma of a cigar or the bouquet of a Burgundy.

Naturalism, then, should stick close to the fundamental reality of practical experience. Holding fast by this, it may proceed to analyse. In every bit of experience, from the simplest to the most complex, an objective and a subjective aspect may be distinguished. In the daily experience to which our senses minister the objective aspect offers a field to the student of physics; and for the special purposes of his inquiry he submits this to further analysis. To the student of psychology, on the other hand, the subjective aspect offers a field of co-ordinate importance, in which he employs his special methods of analysis. Unfortunately, the almost inevitable tendency of the specialist to magnify his office and to allow his own results to hide the rest of the universe leads the physicist and the

psychologist alike to forget or ignore the fact that each is dealing with but one side of the shield of experience, and that the reality abides not merely in the detailed chasings of the one side or the other, but in the shield itself in its entirety and its integrity. And then steps by some dainty philosopher bent on picking the brains of both and co-ordinating their results; he finds that when the physicist has pared away nearly all his side of the shield there remains a residual film of energy, and when the psychologist has pared away nearly all his side of the shield there remains a residual film of consciousness. Unable to separate these residual films, which form all that is left of the shield, he identifies the two, and smilingly assures us that he has solved the ultimate riddle of the shield. Ill would it become me to ridicule the results which this philosopher has reached. I believe that just as the outcome of the analysis of physicist and psychologist is essentially helpful, so may the co-ordination of these results in a theory of ultimate monism be of real service. But if the philosopher holds up to our view the residual film and exclaims: This then is the true and veritable shield; the naturalist must step in and say: Pardon me; you have managed between you to whittle away the shield itself; and what remains is little more than a formula, valid enough no doubt, but thin and filmy to a degree. In the name of naturalism I say, give me back the shield.

All this, it may however be said, though it is dull enough to be possibly true, is no answer to the searching inquiries of scepticism. It comes to no more than this, that naturalism accepts experience as it finds it and says to the sceptical critic: Don't bother me with problems which have no interest for me and which I can't solve.

Well! it seems to me that the first question that naturalism, or any other theory of the world, has to face is this: What is to be the criterion of reality? And that naturalism should reply to this question, that direct experience is the only valid criterion we have. The analyst's reply is quite different. That which remains after the most searching and rigorous analysis is, he tells us, the ultimate reality. And his method lands us either in untenable materialism

on the one hand, or, on the other hand, in an idealism, so called, which "admits of no answer and produces no conviction."

Nothing I venture to affirm can be more real than a bit of practical experience in the moment of that experience; and if in analysis we *distinguish* therein an objective aspect on the one hand and a subjective aspect on the other hand, let us remember that these two are of strictly co-ordinate reality. The objective aspect of our experience—the world as we experience it, in every detail of form and color of sound and scent—is, I repeat, of strictly co-ordinate reality with the subjective aspect. In experience neither is before nor after the other for they are one and indivisible, though they are distinguishable in analysis.

Accepting this criterion, however, new questions at once suggest themselves. Since the experience is individual—let me say for the sake of emphasis *my* experience—what may be real for me, may be real for no one else. Suppose that I am color-blind, my geraniums will bear flowers indistinguishable in color from the leaves of the plant. The flowers for me are really green. But for you they are really red. How are we to get over this discrepancy? The flowers themselves cannot be really at the same time both red and green. Naturalism boldly asserts that they can—green to me and red to you. Not, be it noted, both red and green either to me or to you, but red to one and green to the other. But since to the normal human being they are, under the usual conditions of sunlight illumination, red, we may say that they are really red to the normal man. It must not be forgotten that experience is impossible in the absence of someone who experiences: and if the someones differ, the experience itself must so far be different. When we come to consider æsthetics and ethics we find that these facts are of such importance that they cannot be overlooked.

But what about the objective world when no one is there to experience it? First of all it is not then actually objective in the sense in which I have been using the word. For object is the correlative of subject, and in the absence of experience neither term of the correlative couple has any present existence as such. But surely, it will be said, the world, or at any rate something, persists whether we are

there to experience it or not. I am not prepared to deny it. Nay, more I am, for my own part, bound to confess that I assume that it is so; that I cannot in my thinking get on without the assumption; and that all experience seems to me to justify the assumption.

I have now at sufficient length explained what are the leading tenets of a naturalism which differs in certain marked respects from that which Mr. Balfour had in view, They are as follows:

1. Naturalism sweeps through the whole range of the knowable.

2. It is nowise antagonistic to or exclusive of supernaturalism.

3. It takes as its criterion of reality direct experience prior to the analysis of science.

4. Of the two aspects of experience which primary analysis first discloses, the objective and the subjective, it regards both as of strictly co-ordinate reality.

5. It asserts the inherent and intrinsic worth and dignity of the human ideals.

6. It refuses to admit that natural selection, potent as this may be as a factor in organic evolution, is to be regarded as chief naturalistic factor in human evolution.

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THE NEW ORTHODOXY.

ORTHODOXY is the confidence that a certain proposition is right and that all other propositions which contradict it are wrong. Accordingly, orthodoxy, or rightness of opinion, is the natural aim of both science and religion, and what we need most in our churches, schools, and universities is genuine orthodoxy. But how shall we obtain it? Is not orthodoxy, perhaps, a *fata morgana*, an unsubstantial vision which eludes our groping hand and surrenders us to the illusion of blind faith? Indeed, it has come to pass in these days in which agnosticism is the fashionable philosophy of the time, that a religious indifference like a spiritual blight has taken a strong hold of the human mind so as to discredit any kind of orthodoxy, and the doctrine of the vanity of all faith, be it scientific or religious, has come to be recognised as the sum of all human wisdom. But the very existence of science plainly demonstrates that whatever errors we may have inherited from the scientists and the religious teachers of the past, we must never lose faith in the ideal of Orthodoxy, which implies that there is truth and error, that the truth is one and self-consistent, and that whatever conflicts with the truth is error. This is no denial of the theory of the relativity of knowledge, nor does it imply the assumption that a man can become omniscient; but in spite of the relativity of knowledge, and in spite of the insufficiency of our means of investigating all the details of the immeasurable universe, we must remain assured that man can discern between truth and error, he can solve the various problems with which he is confronted, and he can realise, at least in part, and step by step, the ideal of orthodoxy.

Science has made many new discoveries in this century and has

established truths which widen our spiritual horizon and deepen our philosophical understanding. Under these conditions it is but natural that our religious beliefs, too, will have to be revised and restated. They must be purified in the furnace of scientific critique, and I trust that thereby they will not lose in religious significance. On the contrary, they can only gain in every respect; and after the fusing and refining religion will be purer and shine brighter than ever.

There is no need either to defend or to denounce the old orthodoxy, but it is important to understand the nature of the ideal of orthodoxy and to propound on this basis a new conception of orthodoxy which is the only possible ground of a reconciliation of Religion with Science. Agnosticism will not save us, and blind faith has no warrant, but we must broaden both our science and our religion until our religion becomes scientific, and our science religious. On the one hand, we must scientifically and fearlessly investigate the eternal psychical, social, and cosmic facts upon which religion rests; and on the other hand, we must recognise the divinity of scientific truth, imbue it with religious devotion, and seek its religious significance.

How often has Religion been denounced in the name of Science as superstition, and how often has Science been pilloried in the name of Religion as ungodly and profane! Scientists may err and religious doctrines may be wrong, but Science cannot be anti-religious and Religion cannot be anti-scientific; for what is Science but the search for truth, according to the best, the most reliable, and most accurate methods of investigation, and what is Religion but the love of truth applied to practical life!

It is understood that we must be on our guard not to accept the opinion of a scientist as genuine Science, yet we should not denounce Science itself or the principles of Science. However much we may distrust the calculation of an example, and the logical conclusions of a syllogism, we cannot question the reliability of arithmetic or the trustworthiness of logic.

Such is the narrowness of our traditional conceptions of Science and Religion, that both are sought in their externalities. Religion

is defined as a belief in dogmas, or as worship of one or several gods, or as the practice of ceremonies, such as incense burning, baptising, and mass-reading, while Science is described as a mere collecting, classifying, and collating of facts. And it is noteworthy that there are scientists who misunderstand the spirit of Science and there are clergymen who have no idea of the meaning of religion. How is that possible? Indeed it is natural; for the routine workers in both fields are so preoccupied with the exact observation of their traditional practices that they become absolutely unfit to understand the significance of their professions in the universal economy of mankind.

And can there be any doubt about the cause of the conflict between a one-sided Science and a one-sided Religion? The cause of the conflict is on the one hand the paganism of those who, forgetful of the fact that dogmas are symbols, urge a belief in the letter, which inextricably implicates them more and more in absurdities until they begin to hate reason and decry the light of science because it blinds their eyes. On the other hand we are confronted with a lack of trust in truth that is widely spread among the men of science. There are many scientists who judge religious questions from their limited field of inquiry, and imagine that the lower spheres of nature are the whole of nature. Chemistry is expected to solve the problems of psychology, morality is subsumed under zoölogy, and science is identified with materialism. Man because he is an animal is supposed to be a beast. This is no exaggeration, for such and similar statements have been actually made by prominent naturalists. No wonder that, where such a confusion of thought prevails those who set their trust in the letter of their sacred traditions will glory in the bankruptcy of science as being the best evidence of the truth of religion, while science will fall a prey to agnosticism and pessimism. No lesser authority than Huxley pronounced the dreary theory that nature and the laws of nature, including the laws that govern the social relations of man, are intrinsically immoral.

Here is not the place to refute the self-contradictory argument of those who rejoice in the alleged bankruptcy of Science and vainly

attempt by logical fallacies to prove the fallaciousness of reason. Suffice it to say that the extinction of the light of Science will never make Religion brighter. The moon is better seen when the sun is hidden; but if you extinguish the sun, even the moon will cease to shine. By rendering the Logos illogical, you not only make Science impossible, but also change Religion into the superstition of mere traditionalism. The acceptance or rejection of Science means the parting path between genuine Religion and superstition.

What is Science that, in the name of Religion, it should be abused and denounced? Science formulates the facts of our experience in natural laws; it searches for and describes the eternal of nature. Thus science is the embodiment of the immutable world-order of the Logos that was in the beginning, of God in His revelation, and truly, "this is the stone which was set at naught of the builders, which is become the head of the corner." (Acts, IV., 11.)

Science offers a description of experience from which the purely subjective elements have been discarded. Science eliminates sentiment, passions, and prejudice, and undertakes to establish objective truth. Science drops the human of man; it liberates him from the limitations of the senses, and reveals before his mental vision the secret inter-relation of cause and effect, and the order of immutable laws. In a word, Science is superhuman; it is the Jacob's ladder, which at its bottom touches the world of sense, while its top reaches into the heaven of spirit.

Whenever God speaks to man, it is not in the earthquake of bigotry or dogma, nor in the fire of fanaticism, but he comes in the still small voice, and the still small voice is heard in Science, for Science is an utter surrender of what we wish to believe to a recognition of the actual fact. Science is a hushing of all thought of self, so as to give room to a calm contemplation of truth.

If you want a Religion that is truly catholic, let it be in accord with Science.

Catholic is that which is universally acceptable, and what is more catholic than Science? For the establishment of a Catholic Religion, therefore, we must select the objectivity of scientific truth as the cornerstone. This and nothing else is the eternal Logos

which is exemplified in the noble lives of the prophets, and the incarnation of which constitutes the sonship of God. This and nothing else is the basis of Religion; and no man can lay another foundation.

Science is sometimes erroneously supposed to be a human invention; it is represented as the truth of man, which is contrasted to the divine revelation of religious dogmas as being the truth of God. But Science is not of human make; Science cannot be fashioned by man as he pleases; Science is stern and unalterable; it is a revelation which cannot be invented but must be discovered. There is a holiness in mathematics, and there is ethics in the multiplication-table. On the other hand, dogmas such as the various churches have formulated as their platforms, are the expressions of human opinions. They have been framed by the religious leaders of the past and have been accepted or rejected through majority decisions of so-called œcumenical councils. They are, I grant, sacred documents of what our ancestors thought to be the truth; they have been cast in the mould of mighty personalities, but they are merely a reflexion of the spirit of their age, including all its noble aspirations and shortcomings.

Our traditions and the formulations of belief, as set forth in the Credos of former centuries, are unquestionably important statements; they must be considered and reconsidered, and are in a sense authoritative, as coming from men whom we respect, but they are not a final decision of all problems; they possess no absolute authority and can bind neither our reason nor our conscience. It is our sacred duty to revise them again and again in the light of that direct revelation of truth which is always and constantly accessible to man. Man can find salvation only through a scrupulous self-examination and a right comprehension of the events of life.

If you find traditional formulations of faith acceptable, let them stand on the same principle as scientific truths. Scientific truths are always liable to revision, and no scientist makes the slightest objection to having his propositions revised. Why should theologians do so? Scientific truths once rightly formulated need shun no criticism,

since upon re-examination they will be corroborated; and, if they be misunderstood or forgotten, they can be rediscovered.

Science, it is true, appears as an enemy of the old dogmatism, which to the unthinking made religion easy. Science discredits blind faith and rejects the trust in the letter. It may destroy many long-cherished prejudices that have become dear to us. But if a dogma cannot stand scientific criticism, if it is not true, how can it comfort us? Let a dogma that is untrue go, and have trust in truth. The truth, whatever it be, let us be assured, will be the best. Truth is better than the most beautiful dream, and, if truth appears bitter at first sight, let us be patient. If Science destroys, it is sure to give us something better.

While dogmas, viz., the platforms of the various churches, are man-made, we should not forget that they nevertheless reflect the truth of a revelation that is superhuman. They may not be true in their letter, yet are they full of meaning. The truths of this meaning appear in a new light with every advance of civilisation and will be better understood at every stage reached by Science. Let us always bear in mind that Religion, although it must be one with Science, is not Science; the province of Religion is the broad field of practical life, and its aim is to teach moral truths to the masses, not by proving them in logical deductions, but by explaining them in allegories, and the symbolic nature of ecclesiastical dogmas has never been doubted except by the most narrow-minded dogmatists. The Church actually calls the confession of faith a "symbolum," and Christ declared that he spoke in parables only. It is a perversion of the fundamental meaning of our religious revelation to demand a belief in the letter where confessedly from the beginning nothing but a symbolic expression of a deeper mystery was offered?

Neither the prophets, nor Christ, nor the apostles ever intended to set up a system of revelation that should be contrary to Science. It is true that they proclaimed many truths which the sages of their time did not grasp,—love of enemies and charity; but a deeper comprehension of the facts of life proved that, upon the whole, their ethical injunctions were right in spite of their apparent impracticability.

Let us not be afraid to analyse religion. Do not think that if the nature of the symbol is explained, nothing will be left. If the myth is understood, we become acquainted with the truth itself, which we formerly had merely seen as through a glass, darkly, in the tinsel deckings of poetic imagery.

Authority is sometimes contrasted with Argument, and the weight of a name is proffered to check the boldness of progressive thought. But there is no sense in speaking of Authority as opposed to Reason ; for if by Authority is meant the confidence which we have in a person, what is it but our respect for the soundness of his judgment ? Indeed, there is no authority of person ; all authority is ultimately the authority of provable truth ; it is the authority of Science, and rests upon the superpersonal authority of the divine Logos.

To praise Authority at the expense of Science and Reason is like accepting a greenback and repudiating the gold which the greenback represents. An unredeemable greenback is a mere scrap of paper, and authority not based upon experience that can critically be tested and verified by renewed experience, is a mere usurpation of power. There is no genuine authority which when analysed is not reducible to experience, and as science is systematised experience, we should think that there is no sense in the contrast between Science and Authority.

While we must insist on the recognition of the authority of Science, we should not be blind to the great preference of Religion in having been the first to point out that justice is more powerful than violence, and charity stronger than vengeance. At present, Religion being naturally conservative is lagging behind Science, but there was a time when Science was lagging behind Religion. Religious prophets have in former ages propounded moral ideals, sternly demanding their practical application, the rationality of which the scientists of the time were not sufficiently advanced to prove. Religion anticipated many moral truths which modern Science is only now beginning to understand. When commending Science as the ultimate criterion of truth, let us not forget the great service which Religion rendered while Science was still in its swaddling clothes !

To sum up: any faith that is irreconcilable with Science is doomed. He who rejects Science blights the life of Religion. For the spirit of genuine Religion is the same as the spirit of genuine Science. Science is a divine revelation. Contempt for science and a deliberate suppression of reason is an intellectual sin; it is the sin against the spirit which cannot be forgiven, but must, if persisted in, ultimately lead to eternal perdition.

Therefore, what we need most dearly is Orthodoxy, but let our Orthodoxy be genuine.

EDITOR.

THE FIFTH GOSPEL.

EVERY revelation granted to man is at the outset denounced as atheistic and sacrilegious. The flash that follows the "Let there be light" sadly changes the faces of the gods, whether they be the Dagon born of man's fingers, or the Dogmas of his fancy, as they stand in their twilight shrines, thick with the smoke of incense or hazy with the "dim religious light" of mystic contemplation. Not only this, but the dazzling glare pains to the blinding-point the eye of faith until the familiar features, nay, even the majestic outlines of the Divine Form seem utterly lost, and it is little wonder that the shuddering cry goes up, "Great Pan is dead!" The instant impulse, almost too strong to be resisted, is to turn the back upon the light which has wrought this havoc, declare it a bale-fire, an *ignis fatuus*, a lying illumination, and thus save both eyes and theology. There is plenty of darkness left to construct another shrine. And this is the course usually taken in point of fact, but is it wisest, not to say bravest, or manliest? Whoever follows it, proves himself to have been worshipping, *not* the Deity, but his own pet conception of Him; Light cannot alter Being, only its appearance. And yet "Thou that destroyest the law and the prophets" is the denunciation hurled at every new light-bringer.

A courageous few, however, turn and unshrinkingly face the dazzling ray of golden sunlight which has shot unbidden across the purple twilight of the sanctuary, proudly secure that whatever is true cannot be altered, whatever is untrue is unworthy of their homage. As ever the bravest course is the happiest, and although the shrine is seen shattered and empty, while the rich vestments, brain-woven and fancy-dyed, with which, with unconscious irony,

divinity has been "adorned," lie folded upon the floor like the grave-clothes at the feet of Lazarus, yet the roof is found to have been but a veil of twilight and shadows, and heaven above is revealed.

And as their glad eyes gaze up into the sapphire, star-sprinkled vault, they are again aware of a Presence of far lovelier, though vaguer outline, and though more remote, of a grandeur never before conceived.

This is peculiarly true of that great burst of eternal truth which broke upon the world chiefly through the work and genius of Charles Darwin. Its dawning was heralded by a shudder and a shriek from every pew and pulpit, and "Darwinism" became a synonym for blasphemy. Its truth was vehemently denied, its logic mercilessly ridiculed, its "debasement tendencies" furiously denounced. It was to be given no quarter, for if tolerated for a moment it would utterly destroy every vestige not only of religion, but of the religious spirit, and yet I venture to herald it to-day as the long-missing "Fifth Evangel," "The Gospel according to Darwin." Instead of destroying the religious spirit, it reanimates it, and places it upon stronger foundations than ever before.

This may seem an extravagant and extraordinary statement, but it can be shown to be far from unfounded. In the first place, it restores the grand unity of the universe, and proves the fundamental harmony of its conflicting forces. There is no hanging in the balance between the forces of good and evil, no perilous and often doubtful conflict between a beneficent World Spirit and a malevolent one: no such thing as abstract or essential "evil": nothing but a magnificent scheme of glorious progress through conflict. Storm and darkness, hunger and cold, war and wanderings, nay, even pestilence and famine, are seen to be spurs to progress, mothers of invention, and the stern nurses of all the virtues. Never has the doctrine of the Old Gospel that "all things work together for good to them that love the Good" received such tremendous endorsement. Instead of gazing upon a world of blind, remorseless chance, or inevitable fate, so full of cruelty, injustice, and needless suffering, as to absolutely require the conception or invention of "another

world," to even partially remedy its inequalities, the Darwinist sees all things and all forces moving steadily forward in one grand and gloriously beneficent scheme of advancement. Nature's only and unvarying war-cry is "Excelsior!"

The old Evangelists did at times catch glimpses of this truth from the mountain-peaks of their loftiest spiritual raptures, but it was soon lost sight of in the mist of the valley and fog of the fen, into which the churches were plunged in that palsied time which heralded the death of the great Roman Empire.

None of them, however, even dreamed of a light which should reveal a harmony and an order in that far more bitter, more hopeless and perplexing conflict which is incessantly present in the soul of man itself. Even to Paul's magnificent intellect, the only possible result is that one of the conflicting forces *must* and inevitably will utterly destroy the other. "The carnal mind is enmity against God, and is not subject to the law of God, neither indeed can it be. . . . To be carnally minded is death." In the mild radiance of the Fifth Gospel even this struggle, like every other, is seen to surely and inevitably result in progress, to which both forces are absolutely necessary. The "enmity" between them is merely that between the steam-chest and the driving-wheel in the great engine, or, more accurately, between the panting young giant in the cylinder and the piston-rod, each fiercely asserting itself against the other, and between them driving the great wheel. Browning has caught the same ray of dawn when he cries :

"As the bird wings and sings

Let us cry, "All good things

Are ours, nor soul helps flesh more, now, than flesh helps soul."

Our passions and appetites are seen to be the great driving forces of our nature, and even the term "animal," as applied to them, carries with it no stigma of degradation; on the contrary, it suggests much that is brave, faithful, and self-denying. By far the longest, and not by any means the least noble part of our pedigree lies outside of the human family.

One of Darwin's greatest services was the proving that our

moral impulses are derived, not from education nor external revelation, nor from the cold calculations and experimental deductions of "refined selfishness," according to either Bentham or Spencer, but from the warm and beautiful family affections, those ties of blood, whose golden links are alike binding upon the dove upon its nest, the deer in its covert, the lioness in her lair, and the mother by the hearthstone. The courage, the patience, the cheerfulness, the affections, that are in us are just as essentially "carnal" as are the "lusts of the flesh" and the "pride of life," and what is more, are more numerous and more powerful. Our deepest and strongest instincts in the long run are found to be on the side of "right."

The most exquisite result of this perception is a delicious sense of harmony and sympathy with nature and all that she contains. The world is no longer either "vile" or "unfriendly" in either its human or its physical aspects. "The Prince of the Power of it" has disappeared; all men of all races become brethren upon the common ground of the great, noble, primitive instincts, and even the beasts of the field and the fowls of the air are glowing with that "touch of nature" which "makes the whole world kin." The only thing in it that we could profitably alter is our own conceited, babyish selves.

Another proof of the inspiration of the Fifth Gospel is the calm and rational view which it enables us to take of death. To remove the fear of this has been a leading aim of all former revelations, but it is to be doubted whether they have not the rather intensified it, as they all unite in characterising it as the King of Terrors, the bitterest of evils, and the great enemy of the race.

The new light pierces these grisly, ghostly draperies, woven of fear and darkness, and shows behind them a gentle, painless, grandly-beneficent process of nature, by which the old is tenderly and reverently laid away to dissolve and reappear in the new.

Bracken dies and enriches the mold so that the anemone, violet, and the primrose may lift their dainty heads and scatter their perfume through copse and glen. Here is the Resurrection of the Body. Nothing is lost, but much is gained by the change.

The Mexican aloe lives a century, scatters its myriad seeds,

then peacefully fades and dies, but its seeds take root upon its very grave, and give birth to other winged seeds, and so on through thousands of centuries. The vital spark has never once gone out, but burns with a brighter, richer, intenser glow in each succeeding generation. The primitive aloe is still alive and in a fuller, richer sense than ever before. This is Life Eternal, and what is better, Life Improving. Is not this a nobler, higher, more unselfish conception than that of an indefinite prolongation of our own petty, personal existence? This is an immortality worth having, for it provides for progress.

We are immortal physically in the course of nature, and mentally and morally in our influence, so far as this is for good. All that is true, all that is good in us and in our influence, will survive to all the ages: all that is false and base will be ruthlessly crushed and destroyed, ground into powder by the mills of the gods. It is not a question of whether we, as a whole, will be "saved" or "lost" but of how much of us.

Even if I have been heard this far without indignant interruptions, a dozen voices which can no longer be restrained, now burst out with the question, "But what possible claim to the title of a 'Gospel,' a 'Good News,' can be made by a revelation, the chief factor and very essence of whose 'plan of salvation' is a fierce conflict of physical force, a contest of tooth and claw, in which of necessity mere brute strength and selfishness must prove the victorious qualities?"

But is this last apparently self-evident conclusion, a logical one? It most emphatically is not! And, further, strange as it may seem, is flatly contradicted by the facts. Not only has the decrease of selfishness and the growth of the affections been one of the most prominent features in the upward development of the forms of being, but it has also been a most important factor in that progress. The supremacy of intelligence in the struggle for existence is universally admitted, and the chief training-school, if not the very birth-place of this intelligence, is in the care for others, first inspired by parental affection.

Nothing but the lowest degree of intelligence or development

is possible without affection. The crocodile, the shark, and the viper are models, not only of cruelty and ferocity, but of stupidity and dulness. It is no mere coincidence that that great kingdom of living forms whose distinguishing and proudest characteristic is the possession of a milk-gland (a purely *altruistic* organ) should far out-rank all others in beauty, vigor, and cerebral development. If they could be said to have any rivals in this last characteristic, it would be those patient but brilliant little toilers, the ants and the bees, whose whole existence is literally a slavery to, or martyrdom for, others.

War and conflict are extraordinary breeders of intelligence, but co-operation and protection are even greater. Not only are mammals far superior to all the other classes of life of living forms because they suckle their young, instead of leaving them to the tender mercies of the waves and the sun, but among them by far the most intelligent and most secure from hostile attack are those which group themselves together in more or less firmly-organised packs or herds.

Compare for a moment the dog, the horse, the elephant, with the tiger, the bear, the wild boar. Indeed an accurate classification of the intelligence and perfection of living forms could be made upon the basis of the degree of care they take of their offspring, and of unselfish interest in their kind. The same truth holds good through the different grades of the human family itself. The mere fact that the weak cannot command justice, not only stamps any tribe as barbarous, but just as certainly keeps it so, and as we go down the scale, we finally reach a point where justice, humanity, and even family affection sink to the very lowest ebb, and with them inexorably culture, intelligence, and fighting power. The very name of the "man-of-the-woods," the "*homo silvaticus*," "salvage," "savage" has become a synonym for cruelty and ferocious indifference to the rights of others. The savage is the very incarnation of aggression, remorseless selfishness, the *beau ideal* of the man most likely to "survive in the struggle for existence" according to popular and theological conception, but does that make him even the best fighting-man in the world? The question answers itself. A

mere handful of civilised troops can scatter swarms of savage bowmen or even riflemen, simply by virtue of their confidence in one another. Selfishness is a great force, but affection is a greater. Sweetness, and light, and love, and beauty abound in the higher types, both animal and human, because they are emphatically the winning qualities in the upward struggle.

Stronger far than the crashing sweep of the hurricane or the thunderous rush of the storm-stirred Atlantic, keener and more penetrating than the blackest and bitterest frost or the jagged spear of the lightning is the sweet, golden sunshine, the loveliest and the strongest thing in the world. Beauty and morality are abundantly able to take care of themselves in the fiercest struggle without any assistance from either academies or religions.

Let no one, however, imagine for a moment that a flabby æstheticism or weak amiability can fill the requirements for survival. Far from it. Valuable and powerful as are love and beauty, the one virtue which is absolutely indispensable, and separated from which they are of little avail, is courage; clear, indomitable, inexhaustible. Though the former are unquestionably the controlling and moulding influences of progress, the latter is the great positive motive force. The one unpardonable sin is cowardice. Kind intentions, without the courage to carry them into effect, are of but little value either to their object or their possessor. Courage is not only the basis, but the very mother of the virtues. The thoroughly brave man is almost never cruel, treacherous, or untruthful. Its absence is not only the provoker, but the very essence of the majority of the vices. It is cowardice that literally makes the liar, the cheat, the traitor; courage, the Washington, the patriot, the reformer.

In spite of his harsh features and rude manners, this fierce, reckless, battle-loving, but warm-hearted old Titan is clearly the chief of all the virtues, instead of a creature to be ignored or even discountenanced, except in certain "moral" forms, as he is regarded by that effeminate and rose-water essence which many Christians extract from the Fourth Gospel.

One of the strongest claims of the Fifth Gospel is the light which it throws upon that problem, "The Origin and Relations of

Evil." By its rays evil is seen, and can even be demonstrated to be mainly one of the necessary accompaniments of the development of Good into Better. If movement is to occur, it must be possible in all directions, and the power of advancing inevitably carries with it the possibility of retreat. The possibility of growth must include that of decay. Evil is the shadow thrown by the sunlight of the good. Good is positive and absolute; evil is negative and relative. Almost every evil, viewed broadly and attentively, is seen to be at bottom mainly a relative or temporary absence of good, and in many cases, repulsive as it may be at first sight, to be ultimately beneficent in its nature.

More than this, much of what we term evil is a necessary part of the scheme of progress. To use a mechanical illustration, not only is falling an indispensable corollary of, or antithesis to, rising, but also an essential factor in forward motion. That incarnate poetry of motion, the flight of the lordly eagle, consists of a quick, short dash, with a few score strokes of his powerful wings to a dizzy height, followed by a circling, swooping, triumphant descent on motionless, outstretched pinions, a veritable riding upon the wings of the wind, covering half a country-side in its sweep. Here progress is attained, not so much by the rise, as by the long, sweeping descent which follows it, and *both* movements are alike indispensable.

To soar aloft merely to brave the eye of the sun-god, or to excite the admiration and reverence of the rest of the feathered tribes, as the classic myth of the kingly bird supposes, would be simply a fruitless and foolish waste of energy; and yet in the spiritual realm, many a pinnacle of saintliness, many a state of ecstasy, has been attained from highly similar motives, and proved equally barren of results. Much of what we term absolute good would be sterile unless mixed with apparent evil. The whole process of human locomotion, not only physical but mental, is literally a series of interrupted falls. Our only chance of advancing is to fall in the right direction and keep at it. Our only struggle should be, not to avoid falling, but to fall forward.

Of all the innumerable forms of evil probably none is so obtru-

sively self-evident, or so universally denounced and deplored by philosophers of every system, priests of every creed, and observers of every age, as pain. On its presence and frequency alone have been founded most of the doubts and denials of the goodness of God, or the benevolence of the universe. It is generally accepted as almost pure evil, and by its mere presence, a standing reflexion upon the intelligence and competence of the Great Architect. The sight, or even thought, of suffering is abhorrent to us, and we are sure that "Providence" ought not to "permit" it in any form. But is not this, after all, a somewhat short-sighted and childish way of regarding the question? Pain is indeed hard to bear, and harder to look upon, but is there no harvest which its sharp sickle reaps? Of a surety there is, and a golden one, which can be gathered by no other means.

First and foremost of all, pain is the great danger-signal of nature, the spark struck from the clash of the organism against its environment. Heed its warning, avoid or remove its cause, and all will be well; neglect it, and a worse thing will befall us. It is the cry of the frightened tissues for help, and there is usually plenty of time for this to reach them if we send promptly on hearing the alarm. Without pain, in times of danger, we should be half dead before we knew we were ill. Cut the nerve which supplies a rabbit's eye and lids with common sensation, leaving everything else untouched, and what is the result? The eye soon becomes suffused, then the crystal cornea becomes clouded, next inflamed, and finally suppuration sets in, and the eye is lost. What can have caused this, for the sight was still perfect, the lids uninjured and active as ever, and the circulation unimpaired? Simply the fact that sensation being destroyed and pain prevented, the lids did not know when or how to close, nor the lachrymal glands when to secrete, and the delicate cornea was dried and cracked by the air and rasped by the dust till it blazed up into fatal inflammation. The presence of pain is distressing, but its *absence* is fatal.

Again, it is impossible from a philosophic point of view to ignore the fact that pain, or the dread of it, has been, and yet is, an extraordinary, a most powerful and constant stimulus to progress.

Take for instance the milder forms of it, known as discomfort, such as hunger, cold, etc., and what an important part of our actions do they even yet determine. How much work would we do if we were suddenly removed from all fear of them? Fully two-thirds of the turrets and battlements of that magnificent pile which we call modern civilisation have been reared under the lash of these stern but beneficent task-masters. Considered as a motive power alone, hunger has few equals.

If necessity be the mother of invention, then pain is the father of scientific discovery. So long as the influences of our surroundings and the workings of our own internal mechanism are productive of pleasurable or indifferent sensations, we are content to lie at ease, like a basking cat in the sun, or like the lotus-eaters "careless of gods and men," without troubling our heads for a moment about the nature, structure, or causes of these things. "Let well enough alone" is our motto. Let discomfort occur, however, and we are at once acutely interested in finding out all about them, and science is born. The healthy man doesn't know he has such a thing as a stomach, the dyspeptic doesn't know he has anything else. In the realm of morals, the "sweetness" of the "uses of adversity" has been universally admitted, while in that part of the physical field which terms itself the spiritual, the value, nay, even essential, meritoriousness of suffering has been so sadly exaggerated, that I almost fear to bring discredit upon my argument by alluding to it.

And here is where the Fifth Gospel gently but decidedly parts company with the Fourth. Although it goes even further in the direction of proving the necessity and even the beneficence of pain, it stops far short of exalting mere suffering into a virtue, or regarding it as the dominant and commonest element in the lot of mankind. The essential benefit of pain lies in the avoidance of its cause, and the reward is to be reaped from the thorny barrens of discomfort by determined effort and incessant struggle and not by tame and pulpy submission. It has no sympathy whatever with the morbid delusion that suffering is *per se* purifying and exalting, and the mere endurance of it a grace; still less that the submission to it is the one principal duty of man. It declines to regard this sun-

kissed, grass-carpeted, flower-gemmed world of ours as a "vale of tears" or "wilderness of woe," and instead of holding that the more disagreeable anything is, the more likely it is to be "good for us," it would deem the fact of any object or action being repugnant to our natural tastes and instincts as at least good presumptive evidence of its injuriousness.

It furnishes a scientific and rational basis for Pestalozzi's dictum that "we do not desire certain things because we believe them to be good, but we hold them to be good because we instinctively desire them." It unhesitatingly declares enjoyment (harmony with environment) to be the normal condition of organised being, suffering the abnormal—comfort the rule, pain the exception; in short, our appetites, impulses, and instincts are the exquisite fruits of the experience of myriads of ancestral generations. If anything about us be divine, they emphatically are, and may be, freely, boldly, joyfully followed—instead of sternly repressed and distorted.

That strange distortion of the teachings of the Master known as orthodox Christianity, which is really a mixture of one-fourth Christ, one-fourth Paul, and one-half pure superstition, regards our passions and appetites as our chiefest enemies, necessary evils, only valuable for the discipline gained in fighting them, permits their indulgence only under protest and with a sort of an air of sneaking apology, and would like to crush them out entirely were it not for the trifling drawback that life itself would be destroyed in the process. And even this consideration has been, alas, no bar to its zeal, especially in the case of other people. From this belief more than from any other have sprung those dark and disgraceful shadows of monasticism, self-torture, and persecution, which have always dogged and too often utterly dimmed its shining course.

Nature's revenge for this contemptuous treatment of her heralds and prophets is swift and signal, and the carrying out of this belief must logically, and always has, resulted in either asceticism or hypocritical licentiousness, and generally in both.

From the standpoint of the Darwinist, our passions are our best friends and trustiest servants, and our instincts and appetites our safest guides. The one may be humored too far, and the other

followed too blindly; but in the long run they will be found to have done us at least ten times as much good as harm. Like Solomon's "virtuous woman," they will "do us good and not evil all the days of our life." This once recognised, the pleasure which comes from their legitimate gratification becomes something to be freely and frankly enjoyed as a mark of nature's approval, instead of a thing to be ashamed of, acknowledged with apologies, and indulged in with grave misgivings.

In short, joy becomes as integral a part of the Fifth Gospel as grief is of the Fourth.

The grand old Greek "joy of living" comes back in broader, manlier, more enduring form, and is of itself a sufficient reason for existing. Once more the mellow glow of the golden sunlight becomes the smile of the great heart of the universe. The mist-wreath upon the blue mountain, the silver flash of the rushing river between the rich green of the reeds, the gorgeous, crimson pageantry of the hosts of heaven in the western sky, and the amethyst light in the eye of woman, are but reflexions of His beauty; the warbling of birds, the song of the wind in the pine-forests, and the murmuring of pebbly brooks, are the echoes of the music of the spheres, and the joyous response which all these stir up in us is part of the grand sympathy of the universe, the love between those of one blood and one lineage. Nor does "Lebenslust" stop here: far from it. Deeper, but even sweeter and more lasting than any of these is the stern joy of battle, the warm throb which answers the touch of the frost-king, the breath of the storm-wind, the dash of the salt spray over the bulwarks, the plunge of the frantic steed. Best of all, the glorious ecstasy of taking our lives between our teeth, and looking danger and death in the face, of daring everything in defence of our loved ones, the fierce music of the clash of swords, and the rattle of musketry, the sweet "smell of the battle afar off." Life is a brave, red-blooded, warm-hearted, joyous thing, which needs no sickly phantasmic "after-world" to render it worth the living.

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GERMANY AND AUSTRIA.

The view which regards psychology as the groundwork of philosophy is by no means a recent one. The votaries of psychological research to-day, however, uphold this view in a slightly different sense from what was customary a hundred and fifty years ago. At that time thinkers were pervaded with the idea that it was possible to find in psychology, "as the natural science of inward experience," a court of last appeal for many hotly-agitated problems of epistemology and metaphysics. To-day considerable scepticism reigns among psychologists regarding the epistemological value of inward experience and self-observation; inquirers are now bent on introducing in their stead objective observation and experiment, and they value the investigations of psychology less for their *immediate* furtherment of other branches of philosophy than for the promising glimpses which they afford, for the first time, of exact though meagre results relative to laws of mental life. The use of experiment in psychological questions, in itself attractive, renders possible the union of several minds in the solution of accurately defined problems, as also the mutual verification of the whole subject under inquiry, of the methods employed, and of the results obtained. All this makes experiment appear as expressly designed for the professional pursuit of this branch of knowledge, according to the precedent of the other experimental natural sciences. The psychological laboratory has become one of the instruments of a well equipped university.

The more numerous and ramified, now, the special investiga-

tions growing out of this method become, the more imperative does the necessity appear of occasionally systematising and condensing the results. Such a rallying-point Wundt's *Physiological Psychology* has been since its first appearance. Each new edition has sought to keep pace with the latest researches. But plan and groundwork of any book constitute after all an intellectual organism, which, although it can develop as a whole, yet in individual parts cannot sustain its growth at the expense of the whole. Some such idea as this perhaps suggested OSWALD KÜLPE'S *Lehrbuch der Psychologie*. After the fourth edition of Wundt's celebrated work and the second German edition of Höffding's *Psychology*, this is perhaps the most important collective treatise of the subject which we have.

A comparison with the two last-mentioned works will show clearly the character of Külpe's book. What distinguishes Külpe from Wundt is, briefly stated, the absence of a physiological and neurological part. He treats only of psychical phenomena; considering neurological phenomena only in so far as they are indispensable for an understanding of the experimental investigations. This is not a difference in point of view, at least as far as principles are concerned, but simply a division of labor. Külpe is a pupil of Wundt's, and upon the whole represents perfectly the latter's views, although deviating from him in minor details. Most of his earlier researches were prosecuted in Wundt's psychological laboratory and published in the latter's *Philosophische Studien*. The book may be termed, therefore, a direct positive outgrowth of the purely psychological part of Wundt's work. It contains a description and verification of experimental methods, and embraces the whole psychology of the senses, of representations, and of attention, throughout applying the vast stores of material accumulated by recent observations. The range of the book is precisely coextensive with that of the new experimental psychology, into the methods and results of which it affords a valuable insight. But we miss that rich and kaleidoscopic portrayal of the psychical life in all its manifold phases, that broad and deep outlook over the whole domain of philosophy, which the solution of psychological problems inevitably affords—all recognised merits of the expositions which Höffding,

and, within more modest limits, the editor of *The Monist* in his book *The Soul of Man*, have given.

* * *

As an attempt at advancing psychology from the opposite side, namely, by purely neurological research, is to be noted a recent work by SIGMUND EXNER, the successor of Brücke to the chair of physiology in the University of Vienna. The author is already well known by his two essays in Hermann's widely used *Handbook of Physiology*, one of which treated of the cerebral cortex, and the other of the principal methods and results of psycho-physics. The first provoked considerable opposition; the second passes for an excellent survey of this difficult and intricate group of problems, although to-day it can no longer be regarded as exhaustive. Exner now appears before the public as the author of an undertaking which is likely to win the attention of every psychologist: *Entwurf zu einer physiologischen Erklärung der psychischen Erscheinungen*. (Part I, 1894.) The author regards it as his task "to trace back the most important psychical phenomena to the gradations of excitatory states of the nerves and nerve-centres, that is, to trace back everything that appears to us in consciousness as manifoldness, to quantitative relations and to differences of the central connexions of nerves and centres, in other essential respects homogeneous."

I am sorry to say that a deplorable misconception has crept into Exner's book, as some remarks of the introduction clearly show. Exner is bent on reducing psychical phenomena to neurological processes and imagines that, having succeeded in this, he will have explained them away as something superfluous, somewhat as the physiologists have done with vital force. What is the purport of this? Are the phenomena of consciousness a mere hypothesis which we make in order to explain to ourselves the physiological processes in the brain, or are they an immediate and certain fact,—indeed, the only immediate and certain fact that exists at all? The naïve materialism of the seventeenth and eighteenth centuries thought exactly as Exner does.

Exner confounds the notions "soul" and "phenomena of con-

sciousness." It is easy enough to explain away soul as an entity, just as we explain away vital force, or the *nisus formativus*, and other personified or hypostatised abstractions; but not consciousness and its phenomena. These could not be abolished, even if we should succeed in rendering perfectly intelligible the processes by which psychical phenomena are produced by transformation from molecular transpositions in the nervous fibres and nerve-cells. But, as a fact, science has abandoned even the search after this secret. The law of causality holds between physical and physical, between psychical and psychical. But psychical and physical are not causally connected together. What we have, are two aspects of one and the same actuality—an outward aspect and an inward aspect. This monistic theory demands, that every psychical act should have a physiological correlate in the central nervous system. For this indeed anatomy, physiology, and pathology have furnished overwhelming evidence in the course of the century. But we cannot rest content with this proof of the general functional dependence of psychical phenomena on the central nervous system. The processes of the central nervous system corresponding to the psychical phenomena must be exhibited in their actual relationship, and the general conception of the parallelism carried out in all its details. This is the sole practical and scientific sense of Exner's "explanation" of psychical phenomena. The general impression of Exner's work is, that neurology is still infinitely remote from what is here characterised as its main object. The phenomena of which he seeks to exhibit the neurological parallels, are voluntary movements and sensations, perceptions, representations, and acts of intelligence. It is certainly not an accident that in the same measure in which the book advances its contents grow more and more psychological and less and less physiological; that the part which introspection plays becomes greater and greater, the range of objective observation smaller and smaller, and the whole more and more theoretical. Exner is like a traveller who attempts to penetrate into a primitive forest without more than a general idea of the direction which he is going to follow. A hundred different paths besides his are possible. Before special research has erected a line of signs and guide-

posts any real enlargement of our knowledge on this road is scarcely to be expected.

* * *

An exceedingly welcome enrichment of the historical literature of the philosophical disciplines is the *Geschichte der neueren deutschen Psychologie* by MAX DESOIR, Privatdocent in the University of Berlin. The first volume of this work appeared in 1894 and covers the period from Leibnitz to Kant. The second volume is to treat of the psychology of speculative German idealism, and the third of the development of German psychology from Herbart to the present time. In view of the extremely slow progress of the excellent work of Hermann Siebeck (Giessen) on the General History of Psychology, which has only just reached the threshold of the modern epoch, Dessoir's book meets an actual want of students.

The present volume, the result of indefatigable industry and of the collation of exceedingly rich materials, is an important contribution to the history of German rationalism and its philosophy, which although familiar in a general way, are very little studied in their detailed aspects. The author seeks to develop the psychological drift of this epoch from its historical and intellectual tendencies, and to follow out the effects of this psychology on the different directions of the intellectual life. Epistemology and æsthetics, morals, law and pedagogics, the systems of medicine, the general views of life which obtained in that period: these are the special objective points of his disquisitions.

Yet the historical import of the work is rivalled by its systematic significance. The comparatively close resemblance of the various systems suggested to the author the felicitous idea of rejecting a chronological treatment of his subject and of condensing together into two introductory chapters the purely literary and bibliographical matter, so as to leave space for elaborating the views of the various authors into a systematic exposition of the psychology of the period as a whole. He gives a chapter on fundamental problems, which is followed by the subject of animal psychology, the extremely important doctrine of the psychical faculties, in all its manifold phases, and lastly, by the associational psychology. The

different authors and schools are all made to speak in their turn. Each one of these chapters offers a picture of the whole cycle of doctrines and controversies of the period.

There is one feature of the work which will win for its author without doubt the gratitude of all foreign readers. He has incorporated systematically and premeditatedly in his work, as much of the original materials as was necessary to make his book an authoritative repository of the sources. This will be fully appreciated when we state that a large proportion of the vast literature which his book has made use of is not only forgotten, but, outside of a few German libraries like Munich, Göttingen, and Berlin, is also practically inaccessible.

Dessoir's book, now, may be characterised as a collection of systematically arranged excerpts from this literature. As such, it has not only a historical but also a material value for the psychologist. There is much patient analysis and excellent observation in the psychology of the last century, and precisely because the psychology of the present has entered upon totally different paths, much useful material for its systematic elaboration can be extracted from these old investigations.

* * *

Still another special philosophical science has noteworthy novelties to show. I refer to *ethics*. Exceedingly rich is the work of GEORGE SIMMEL, Privatdocent in the University of Berlin, entitled *Einleitung in die Moralwissenschaft* (two volumes, Berlin, 1892-1893). We are informed by its subtitle that it is "A Criticism of the Fundamental Notions of Ethics," and in fact critical reflexions and psychological analysis by far outbalance the positive results, at least if we understand ethics in the old sense, which has prevailed almost universally until now, as essentially a normative science. The author, of course, is expressly opposed to such a conception of ethics. He is of the opinion that up to now ethics has not gotten beyond the stage of abstract generality combined with homiletic discourse and the reflexions of so-called practical wisdom. For Simmel further progress of this science is to be anticipated only from an historico-psychological treatment of its principles.

I have the impression that the author has in mind here a condition of ethics which did exist in the past, but which does not obtain at present, at least not universally. The task which French positivism began has become, through the application of the principle of evolution to ethics, a universal and unavoidable requirement. That task is the verification of the ethical norms by a broad and comprehensive induction, which shall exhibit clearly the facts of the moral history and the psychological inter-relationship of the individual and society. No one who will take up the new ethical works of Herbert Spencer and Leslie Stephen, of Laas and Jhering, of Wundt and Höffding, can possibly have the impression of standing before the abstract generality of a pure "ought," which had fallen, as it were, from heaven, or of listening to the proclamation of a "good" which has not found its justification in a retrospect over the whole historical and social development of humanity in the past.

The author is undoubtedly correct when he says that the advancement of ethics, such as we conceive it to-day, is dependent upon the development of science as a whole. Ethics is indeed not an isolated branch and needs for its construction the most varied materials, which must be gathered in the workshops of the psychologist, ethnologist, the historian, sociologist, and political economist. No one can be fruitfully engaged in all these fields at once. Yet, must we on that account renounce all claim to a universal elaboration and employment of these materials? This would be exactly the same mistake as saying that no discipline of logic nor theory of the methods of science could exist in the future, but only the methods of the separate branches; the same mistake that makes its appearance again and again in the belief that the time will come when philosophy will be ousted by the collective methods and results of the separate sciences. The more the division of the single spheres of knowledge is extended, the more will the necessity be felt of retaining or newly creating definite points of unity and reference.

Yet these doubts in the horoscope which Simmel casts of ethics do not impair the value of the researches which he himself offers. What he proposes is the exact description and analysis of all the

complicated psychical facts and processes which answer to a few fundamental ethical notions. Simmel investigates the following cardinal conceptions: duty, egoism and altruism, ethical merit and ethical guilt, happiness in ethics, the categorical imperative, the unity and conflict of ends. All these conceptions play in every systematic construction of ethics a more or less important part; but the form and manner in which they are viewed is in most cases determined by the general suppositions from which the systematic exposition starts. In this way some factors are strongly emphasised, others are neglected; ethical construction and true psychological connexion are not always in accord.

Simmel's contribution thus constitutes an outline of a thorough revision of our fundamental ethical notions. It is not a system, not even the rudiments of a system. His criticisms, however, are extremely suggestive, and will yield rich returns to a person who seeks not so much results as profundity. And that not alone for ethical questions. For this introduction into the science of morals contains, on the one hand, much less ethics than one would expect, and on the other, much more than what is strictly ethical. It reminds us in many respects of Schleiermacher's talented work of the year 1803: *Outlines of a Criticism of Past Theories of Ethics*, by which this thinker prepared the way for his systematic works in the province of morals, and did much important service toward the formation of ethical conceptions.

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Totally different aims are pursued by ALEXIUS MEINONG, Professor in the University of Graz, Austria, in his *Psychologisch-ethische Untersuchungen zur Werth-Theorie* (1894). Meinong's analysis, unlike that of Simmel, is not devoted to the critical examination of widely ramified and complicated relations of thought, but to the exact and determinate comprehension of a single, but central, problem. This problem may be briefly stated as follows: "It is proposed to analyse and describe as exhaustively as possible the conception of value, or *Werth*, in all the varied significance which this notion has for ethics; from which analysis all the fundamental forms of elementary moral judgments are to be derived." All considera-

tions of historical, anthropological, and evolutionary phenomena are here neglected. Nothing is sought except the simplest and most universal expression of the intrinsic laws of those special psychical phenomena which we call moral judgments.

The conception "moral" for our author is a special case of the more general conception "ethical." Meinong states the difference between the two notions as follows: "Ethics investigates what constitutes, particularly in mutual relations, the value of man for man." The object of moral valuation "is man's impersonal participation, determined by his will, in the weal and woe of his fellowmen."

It remains an open question whether this distinction can lay claim to any permanent value. It serves the author as a convenient means of sharply delimiting the subject-matter of his investigations. Within the domain thus marked off, which Meinong calls the province of the good and the bad *par excellence*, arises now a whole series of possible volitional relations which Meinong undertakes to conceive as a totality and to expound in general terms according to their various functional relations. Here is first discussed the opposition of *Ego* and *Alter*, the weal and woe of the one as well as the other. By the side of these fundamental relations stand four categories of moral valuation: the meritorious and the correct on the side of the morally good; the condemnable and admissible on the side of the morally bad. But above and beyond this, experience demonstrates that the combination of the fundamental relations *Ego* and *Alter*, weal and woe, are still far from sufficient for reaching moral valuations; that this would be possible only provided nothing but the end of a definite volition determined the issue of the moral valuation of the volition. Now this can scarcely ever come to pass in real life; for every effect has natural consequences, and to every definite end means belong which must be regarded as partial ends. If the functions indicated are to shape the full analysis of real moral judgments, the morally relevant subsidiary circumstances accompanying a definite act must also be taken into account. By employing, now, a scheme of symbolical notation for the various determinations mentioned, wherein letters are used as in algebra, or in algebraical logic, the author is enabled to express in unequivocal

and accurately determined formulæ universally valid scheme of valuation for moral acts in the narrower sense, viz., for the relation of the *Ego* to the *Alter* with respect to the good and the bad.

I regard these elements of mathematical ethics, understanding by this term the exact deductive and universally valid derivation of moral judgments from fundamental psychological notions, as the really new and valuable feature of Meinong's book. Valuable not because anything is made clearer by the mathematical mode of expression, but simply because the applicability of symbolical mathematical notation affords us the assurance, here as everywhere, that our thought has mastered the fundamental relations of the branch of knowledge in question in its widest universality, and that we are beginning to understand not merely individual and actual cases, but all possible cases. In addition, the careful analysis of the notion of value offers important contributions to the problem of eudæmonism in ethics, and the same is true of two chapters added at the close on "The Moral Ought," and "On Responsibility and Freedom" which similarly attempt to throw new light on much-mooted questions of the idea of value. All in all it is no easy reading; a book in whose ways of thought and exposition we must completely immerse ourselves if we are to derive any profit from it, but withal a work which scientific ethics cannot afford to pass by without notice.

Naturally, this question will suggest itself in the face of the limitations which the author has laid down, Is this method capable of such extension as shall enable us to treat by its aid not only the very elementary moral problems, but also those more difficult relations of things with which the real interest of ethical decisions is usually associated? I have in mind the conflicts between obligations of law and obligations of love, between the principle of welfare and the principle of evolution, and finally, the countless difficulties which grow out of the fact that the *Alter* whose relations to the *Ego* the simple formulæ of Meinong are in search of, is not necessarily an individual but may also be a totality, a nation, or even all mankind. It is just, however, to mention that the author is fully aware of the preparatory and elementary character of his

present performance, and that he has promised a treatment at some future time of the whole field of ethics by means of the principles here reached—an undertaking which we shall await the more eagerly as we know so well the difficulties and complexities of the problems to be solved.

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In connexion with these ethical investigations is to be mentioned, finally, the *System der Pädagogik im Umriss* which August Döring, formerly a practical educationist, now professor of philosophy in the University of Berlin, has recently published (1894). The present work may be regarded as a practical or technical sequel to a former work of the author's, entitled *Philosophische Güterlehre* (1888), which undertook to attack the problem of optimism and pessimism by exhaustive psychological investigations into the possibility and conditions of happiness, and which seeks a fresh justification for the old but much contested reconciliation between happiness and moral merit.

The present work may be regarded as the outcome of the idea that the possibility of happiness in this sense depends on the enhancement of the ethical culture of the individual, and that this in its turn is entirely the work of education. Döring comprehends the object of education in its broadest and noblest sense. His notion of education embraces the physical as well as the psychical development of man, breeding as well as instruction. It is his effort, apart from all actually existing conditions and educational arrangements, to portray a purely conceptual or rational ideal of such an education, which shall embrace all sides of man, and which he justly and with considerable pedagogical wisdom regards as concluded at the end of the fourteenth year. About this period, along the borders of puberty, man in his fundamental traits is pretty nearly formed and his self-education and preparation for his future calling now begins on the basis of what has been already acquired. Döring does not think highly of what is done nowadays in the way of education. He is of opinion that it cannot even be determined at present what education is capable of attaining and that because the true means of education cannot as yet be put into operation to their full extent.

The system of education which is here presented, in judicious and minutely elaborated sketches of even the most detailed parts, is conceived as existing in the general popular educational institutions of a future society in which the present defective and unregulated co-operation of parents and schools shall be replaced by the methodical and trained work of popular professional educators, among whom of course women have a place.

The author goes somewhat further than Plato in his ideal state. He demands that a perfect society should put the education of its children in the hands of persons qualified by nature and training for that task, from the very beginning of the child's life, and not let its education date from a fixed period. It is at bottom a socialistic idea. To do one's uttermost to afford to every creature that wears a human countenance equal chances and equal prospects in life, to equalise the sharp contrasts of nurture and treatment from the first breath of life,—all characteristics of the present state of affairs,—and to leave only the ineffaceable differences of innate and constitutional qualities. An educational Utopia, yet not in the form of a pedagogical novel, but in the dress of a most rigorous and sober system. However, it is not difficult to add in thought the picture of that state of society which contains within it the conditions of realising such a pedagogical ideal. This need not necessarily be a socialistic society, but certainly one in which the smallest social unit hitherto known, the family, shall have been deprived of the functions which it has exercised for thousands and thousands of years. A society in which for this very reason a thoroughgoing employment of women in the general organisation of callings shall present no more difficulties, and in which also the reasons which forced the society of earlier stages of civilisation to impress upon marriage the character of exclusiveness and indissolubility on grounds of justice, shall have largely disappeared.

Are we approaching such a goal? The question is not for discussion here. A literary correspondent is not called upon to be a prophet. I shall only remark that the value of this severely constructed and finished work of Döring's is entirely independent of the idea of a future realisation of a pedagogical Utopia. A finely

thought-out ideal always exercises a regulative influence on the relations of actual life, and the teacher as well as the educator will be able to learn much from Döring's work, even though he may regard an unqualified rationalisation and socialisation of education as neither possible nor desirable.

In closing I may be allowed to mention a work which no doubt will be received with sympathy by the readers of *The Monist*. It is a collection of popular lectures on the theory of evolution, and its significance for our general conception of life, which BENJAMIN VETTER, the well-known German translator of Herbert Spencer's *System of Philosophy*, delivered before a mixed audience at Dresden. As Vetter died shortly afterwards, these lectures were collected by a friend of his and published under the title of *Die moderne Weltanschauung und der Mensch* (1894). Instead of the final revision which Vetter himself had planned, was substituted an examination of the manuscript by Ernst Haeckel, whose pupil Vetter had been, and who has written a cordial preface on the author and his work. Haeckel refers expressly here to his booklet, *Monism as a Bond of Reconciliation Between Religion and Science*, which was written almost simultaneously with these lectures, and which sketched in broad outlines Haeckel's philosophical view of the world. The mere fact that the celebrated naturalist has expressly characterised Vetter's lectures as a completion and extension of this sketch, will be a sufficient recommendation of Vetter's book for all Haeckel's friends. With a great command of the collective results of natural science, which he understands how to make exceedingly plain, is united in him the endeavor to bring nearer to the human heart the monistic view of the world, which has been so often censured by its opponents for its lack of comforting power. His work is pervaded with the thought to which also *The Monist* is dedicated, that it is possible to shape scientific knowledge into a religion if we understand by this idea nothing more than the fervor and enthusiasm with which the vista into the cosmos and its eternal becoming and the place of man in the developmental process of nature fills us.

There are not over many books in German literature which undermine so inexorably the phantasms of the old myth-forming re-

ligions, and understand how to unite so sagaciously new ethical ideals with purely scientific conceptions of the world. And in a time when dualism and mysticism in the most varied forms are making such strenuous efforts to filch from humanity the results of that intellectual labor which has been achieved in the four centuries since the Renaissance, and, under the illusory pretence of a higher wisdom and a purer insight, to set us back into the childhood of thought, into illusion and superstition, such courageous and enthusiastic expositions are welcome allies to the friends of free thought and of a purely scientific view of the world.

FRIEDRICH JODL.

PRAGUE.

FRANCE.

The discourses pronounced at the French Academy afforded me occasion to speak of Taine. Two little books bring before us to-day the figure of Renan: one by M. RAOUL ALLIER, *La philosophie d'Ernest Renan*,¹ the other by M. GABRIEL SÉAILLES, *Ernest Renan, essai de biographie psychologique*.² The best way to comprehend these two opposed types of mind is comparison. Both shone at the same time in the firmament of French thought, and death took both away together—more cruel in the case of Taine, who had not achieved all that he gave promise of, and more kind in the case of Renan, whose decline was becoming apparent. The latter, too, had been a favorite of life. His first bold stroke had won for him celebrity, and he saved himself by a course which for others usually means ruin.

Rebels against the Church are sure to succumb in the struggle, unless they are fully emancipated. Renan was emancipated, and in his case rebellion was dispensed with. Taine was unable to de-

¹F. Alcan, publisher.

²Perrin & Co., publishers.

rive the like advantage from his philosophical boldness. He threw himself with might and main against a powerful school. But philosophical systems do not offer the same resistance that religious dogmas do. The range of philosophical ideas escapes the common run of readers. The public does not judge a man by such enduring qualities ; moreover, for them the insubordination of a monk is a far more alluring spectacle than the free struggles of the intellect : people always scent in such affairs a slight trace of scandal. For retaining the curiosity of the world it is requisite, no doubt, that the actor should have the qualities of the character he plays. Renan possessed these in a marvellous degree. His gentleness was made up of resistance, his mind of subtlety. He did more than fill a part already played ; he created a part of his own. One additional piece of good fortune which he had was the mysterious respect which the student of Hebrew inspires. People saw him shine at the surface ; they did not sound his depths. This art he was adept in—of presenting to the reader ripe grapes carefully packed in baskets, without obliging him to undergo the hardships of their care and vintage.

Taine did not share these advantages in the same degree. Not that he neglected the allurements of colored words, of brilliant metaphors, nor that his books were not adapted to win the interest of worldly readers. But his logic had a still more imperious attraction ; his thought aimed at great precision and required an effort to penetrate it. The virtuosity of Renan was facile and apparently not affected, whilst that of Taine appears slightly strained. In the latter, disdain was tinged with harshness ; in the former, it bore the semblance of indulgence. Also their irony was different, striking and vigorous in Taine, gentle and at times perfidious in Renan.

Different as these two eminent men were in form, they were no less different in their ideas and in the influence they exerted. M. Allier tells us almost nothing of the direct effects produced by M. Renan, but his literary achievements he has analysed with great acumen. He shows us the lasting impression of the teachings of St. Sulpice on the thought of Renan ; his incomplete instruction, and his lack of method ; his conception of philosophy as an epic, or set of variations on a single theme, which the artist renews at will ;

his metaphysical view tainted with Hegel and Schopenhauer, with its God which allures and dupes us; his moral theory which substitutes the emotion of the beautiful for the notion of the good, and sacrifices virtue to the dilettanteism of art and science; his policy of desire, not of action, which leads him to his ideal of a "picturesque" world and a privileged society; and lastly, his religion, which is nothing more nor less than religious and æsthetic sentimentality.

M. Séailles adds to this portrait the need which Renan had of a certitude emanating from without, which was a remnant of his theological servitude. He emphasises again the important circumstance that the enigmatical author of the "Life of Jesus" was a Breton "crossed" by a Gascon, and he discerns in this hereditary duality the cause of the indecision which marked all his ideas.

Taine acted more on philosophical minds, Renan on literary minds. The influence of Taine, moreover, made itself manifest in two ways. As an ardent student of physiological psychology, which was just then in its infancy, he opened up by his book *De l'intelligence* the path which a large division of the French school, including M. Ribot, have since followed. As a critic and historian he applied his method in works which were addressed to a wider public, and if in this field his opinions were not accepted by the world, it sufficed that he began, and here he was in accord with Renan, a salutary reaction against revolutionary prejudices. On all sides, if we estimate him as a whole, his work was fecund; it marks an advance in our knowledge of the mind and of the social phenomena which exhibit the laws of the mind.

Can we say the same of Renan? He never made so much as the pretension, aptly remarks M. Allier, of leaving behind him "one of those systems, in developing, refuting, or correcting, which the progress of thought consists." Above all, he was a *personality*, "He provoked states of the soul, rather than diffused precise ideas." But what are these states of the soul worth? That is the question.

Brutal condemnation would be unjust. It would find no point of attack in that fluid and undulating character, in that scepticism which plays at belief, and that faith which is its own jester. The danger was that the prudent abstinence of Renan should be com-

municated to others without the uprightness of mind which distinguished it in him, that we should have egotism without kindness, laxity without justice, sentimentality without common sense. And in fact all this is found in his cruder disciples; their feet do not fit the footwear of God. The insanity of mysticism which has invaded us made use of his name. With the ethics of Nietzsche, who is a madman, his, too, has confounded many brains. A charming genius and admirable writer he surely was, but withal the sage of the Decadence—one of those perfect masters of forgetfulness and delicate enjoyment who turn from the paths of action and enervate by a taste for vague reveries, the social aristocracy of which they are members. The wisdom of Renan is the asphyxiation of flowers without the nausea, morphine without the puncture.

M. le Marquis de Charnacé, himself a scholar and writer, has just recently written to me as follows: "I knew Renan well, having met him every week at the house of my mother-in-law (the late Countess d'Agoult). He was an artist of great power, but he had no faith in his art. He was thoroughly a child of his time, where real characters are rare. In this respect I liked Littré better, whom we also saw not less frequently. Littré left behind him a monument, etc."

The severity of these judgments will perhaps surprise some of our readers. But they must gain assent nevertheless. The extraordinary success of the illustrious deceased was only possible in virtue of the close accord of his genius with the soul of our wearied generations, and he preferred the task of gently lulling them, to that of assuming their guidance.

* * *

The book of M. CLÉMENCEAU, *La Mêlée sociale*,¹ is written in a different tone. Emotion, sincere, yet slightly tinged with harshness, prevails here, and pity, which we are fain to say is without tenderness. M. Clémenceau expounds in an introduction his ideas on life and the destiny of our species—ideas which are not apt to afford

¹Charpentier, Publisher.

man much consolation. He commits, in my judgment, the error of not perceiving that order and justice exist in the world. He never sets himself to inquire whether science should not put new and properly formulated problems in the place of those which the decaying religions have introduced ; he provides no playground where the human soul has permission to move about. Following others who like him are also in error, he proclaims the injustice of the world, the horror of the struggle for life, and scarcely allows the glimpse of an illusion in his sombre doctrine. Following the affirmation of imprudent materialism comes unfortunately that of a dual-faced pessimism which counsels the two alternatives of enjoyment or despair. Think of the final disaster if the human race should follow swiftly and *en masse* the paths of the prophets ! It is slower in its movements fortunately, and thinks less rapidly ; it waits till the truths that have been offered to it are established and can be assimilated, and thus guards itself against drawing the last consequences of its leaders' errors. It knows the joy as well as the pain of effort, and is led spontaneously by the very necessities of life to the supreme lesson of action.

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Two excellent works are offered to us in French translation.¹ The first is that of DR. LANGE of Copenhagen, translated by M. Georges Dumas. It will be remembered that Dr. Lange gave in 1885 the same answer that Prof. W. James gave the year preceding, to the question, What is emotion considered in its psychological nature? Both scholars were at one on this point, without knowing each other. The result of their analyses, which I scarcely need repeat, is that in every emotion there is an initial fact which may be an idea, an image, a perception, and even a sensation, but the emotion itself can never be more than the consciousness of organic variations induced in the body by the excitation of vaso-motor centres. In short, emotion is the subjective side of the objective states which are usually called its effects. Dr. Lange properly no-

¹F. Alcan, publisher.

tices in the conclusion of his little book, the different reactions which cause variation of the physical expressions of emotion according to individuals, and thus lend varied aspects to fear, anger, etc. He points out the slight emotivity of peoples that have reached a high state of civilisation, as also of the higher classes generally in society, and he explains this fact by the vaso-motor opposition which exists between the intellectual and the affective life. The proper office of education would be to suppress simple and original reflexes and to substitute in their place more elevated ones.

The second work is that of M. MARIO PILO, of Belluno, *La Psychologie du beau et de l'art*, translated by M. A. Dietrich. M. Pilo studies first the "objective factors" of the beautiful. The beautiful, he says, is that which pleases first the senses, then, and eventually, the sentiment, the intelligence, the ideality. The beautiful, accordingly, is something relative to sensibility, to reason, to the ideal which heredity and circumstances have implanted in each of us. A hierarchical scale of the beautiful will conform to the precedent facts. I have several times upheld a similar doctrine. It is opposed to the thesis of Guyau, who seeks in art a sociological instrument, to that of Cousin and Hegel, who make of it an intellectual instrument, and I do not think that it has been demolished by the criticisms of M. Lipps in Germany, nor by those of Mr. H. R. Marshall in the United States. Mr. Marshall in his *Æsthetic Principles* combats the sensorial theory. It is certainly not to be denied that the different elements of our psychical life—sensation, emotion, sympathy, intelligence, and will—are all exercised in some degree in the state of mind which constitutes the notion of the beautiful. But if we seek for what is truly the principal element of it we are constrained to attribute this to sensation, and in fact the order which Mr. Marshall follows in his classification is instructive in this regard: he emphasises the passage from what is most essential to what is less, from that which characterises or specialises the various arts to that which is common to all the arts, to all exercises of mental activity.

M. Pilo next studies the "subjective factors" of the beautiful. His classification of the arts conducts us from the physiological re-

flex to the conscious expression of attested pleasure (criticism), and from the latter to a more or less transfigured reproduction of the thing which has pleased us (art properly so called). Art acting by suggestion, the form, he says, is the main element in it, and the more suggestive the form is in proportion to the means, the higher is the art. This is the case with poetry and with music. The work of M. Pilo is very interesting; but he is mistaken, in my opinion, in thinking that art is destined to replace religion. How can art which remains *pleasure* take the place of religion which seeks to be *knowledge*?

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I shall now mention, although somewhat tardily, two other works touching the grave question of "degeneracy." The one is by M. J. DALLEMAGNE, a Belgian physician, entitled *Dégénérés et Déséquilibrés*;¹ the other by M. A. SANSON, professor of zoötechnics in the agricultural school at Grignon, entitled, *L'Hérédité normale et pathologique*.² We shall find in the book of Dr. Dallemagne a very complete historical *résumé*, with judicious discussions relating to the character and the limits of psychosis and neurosis. M. Sanson strives to make prominent the vague features of the idea which physicians generally have of heredity. He criticises forcibly certain current expressions such as dissimilar heredity, collateral heredity, etc., and establishes precise distinctions between individual heredity, heredity of family (this chapter is the best of the work), and heredity of race or atavism. The mistake of M. Sanson is his wrong estimate of the value of "crossing" and he would appear to push too far his hostility towards the transformist theories. However, I regard his work as excellent and very good for consultation. I would only wish to have the last part cancelled, viz., the conclusion, where M. Sanson omits to support himself on facts which he has himself discussed: Jacobin prejudice replaces here scientific deduction.

¹ F. Alcan, publisher.

² Asselin and Houzeau, publishers.

An excellent study by M. Renouvier is to be read in the *Année philosophique* (1894)¹ on the doctrine of St. Paul. The *Année psychologique*² also promises a rich collection.

LUCIEN ARRÉAT.

PARIS, FRANCE.

A FRENCH VIEW OF THE CHICAGO CONGRESSES.

The reports of the various French commissioners sent to Chicago by the government during the exposition of 1893 are now being issued by the Minister of Commerce. One of the most recent to appear is that of M. Louis de Chasseloup-Laubat devoted to the congresses which were held at the time of the Fair. This report is all the more interesting to us because the author confines his attention wholly to the essays, papers, and speeches contributed by our countrymen and women. "My principal aim is," he says, "to furnish a general account of the way in which Americans look at the great questions of the hour now occupying the attention of the best and most learned minds on both sides of the Atlantic." We have, therefore, in this big quarto of four hundred pages a French view of the American side of the Chicago congresses.

M. de Chasseloup-Laubat's descriptions and comments are generally written in a very broad-minded, cosmopolitan, and friendly spirit, though now and then he has not been able to throw off entirely his French prejudices and ideas. This is particularly the case where he has to do with women and their interests. Thus we find this opinion given in the introductory part of his report :

"The most unfortunate and vexatious feature of the organisation of the congresses of Chicago was the exaggerated importance given to women. Their participation was, in fact, out of all proportion to the papers and the works sent by persons belonging to

¹F. Alcan, publisher.

²F. Alcan, publisher.

the feebler sex. So also the time spent in listening to the speeches of orators in petticoats did not correspond with the value of these bits of eloquence."

And again in his comments on the Purity Congress :

"One of the reasons why nothing practical resulted from this gathering is that a certain number of very respectable ladies, belonging to various feminine associations opposed to vice, felt called upon to mix up the question of moral purity with woman's rights and to demand the political equality of the two sexes. But these two things have nothing in common. It is hard to see how giving women the ballot would make them more virtuous. As far as I know, politics has not had the tendency to render men more chaste."

M. de Chasseloup-Laubat dismisses the Woman's Congress, which was perhaps, with the single exception of the Parliament of Religions, the most largely attended of the whole series, with a single page, though he devotes over one hundred and thirty pages to the Civil Engineering Congress ! And here is his concluding remark concerning this remarkable gathering : "It is very doubtful if this Congress does much for reforming legislation in a direction favorable to woman."

It would not be difficult to "answer" these criticisms, but this is not the purpose of this article ; and, in fact, M. de Chasseloup-Laubat presents such a different front in a paragraph under the Government and Administration Congress, that he almost disarms counter-criticism. He says :

"It is quite true that there exists no serious reason why women, who have attained their majority, should be deprived of the right to vote. The eligibility of women to legislative functions would, however, be more inconvenient than advantageous because men would consider themselves less bound to respect women if the latter entered into the arena of politics." [The history of the last Colorado Legislature contradicts this statement, I believe.] "But there can be no doubt that dropping a ticket into a ballot-box does not in itself constitute an act opposed to woman's rôle in modern society."

The temperance reformers will find more "bones to pick" with

M. de Chasseloup-Laubat than the woman suffragists, for, in his account of the Temperance Congress, he thus pays his respects to the Prohibitionists :

“It is astonishing that there are to be found in the United States so many fanatics having no sort of respect for the rights of others, who are all the more dangerous because they are so respectable and so convinced of the justice of their cause. . . . The anti-alcoholic monomania sometimes carries them to a point so nearly bordering on folly that one is led to ask if persons afflicted with *delirium tremens* are more wild in their ravings than many of the advocates of prohibition.”

The real reason why M. de Chasseloup-Laubat is so bitter in his denunciation of teetotalers crops out in several places of his report of the Temperance Congress, as where he says : “I felt it to be my duty to combat with the greatest energy a proposal whose realisation would entail each year a loss of millions of francs to the wine growers and sellers of champagne, Bordeaux, and Saintonge.”

Among “the precursors and chiefs of the temperance movement” in the United States he places, along with Father Matthew and John B. Gough, whom he imagines to be still among the living, Lincoln !

He next takes up the religious congresses which are treated very fairly. Here is what he has to say of the Catholic Congress :

“The salient point of these reunions was the confirmation of the fact that Catholicism is now undergoing an evolution in the direction of republican and democratic ideas,—one might almost say towards American ideas. It would seem as if the Papacy, uneasy over political events in Europe, were striving to find a solid support among the most powerful nation of the two Americas. After having compromised itself in the Old World by compromising the political systems with which it believed its destiny indissolubly linked, Catholicism has changed its line of conduct and has discovered that it has a grand future in the New World, where the American branch of the Church is young, enterprising, unhampered by any political past, progressive in its acts and absolutely independent because it lives on its own means,—the voluntary donations of the faithful.

This Catholic evolution is certainly a grand and important fact, one of the capital ones revealed in these Chicago congresses."

"Of all the Chicago congresses," this Report truly says, "the Parliament of Religions attracted the most people and called forth the most comment. One saw displayed there a tolerance and respect for the opinions of others that were really admirable. If we except the sitting in which the ladies indulged in noisy protest at the defence of Mussulmanic polygamy, all opinions and all doctrines were listened to with the deference and kindness that is due earnest people defending moral ideas and exposing their conceptions of the grave problems of life and death. This is certainly an interesting and very remarkable fact, and it proves that the spirit of tolerance exists in the United States. . . . The impression produced in America by this Congress was profound, and will doubtless last for a long time, inculcating still more deeply into the nation a respect for the beliefs and opinions of others. In Europe, the results will probably be much less tangible and of minor importance. . . . The Parliament of Religions rendered a grand service to many people. It showed them that though dogmas and forms are dissimilar, morality, the basis and *raison d'être* of religions, is one; it presented to them under varied, complex, and changing appearances a unique, single, and immutable foundation. A small number of choice spirits long ago discovered this truth. The Parliament of Religions opened the eyes of thousands to it,—and this will be the greatest service to humanity rendered by this Congress."

In closing his very readable and creditable Report, M. de Chasseloup-Laubat writes:

"Whatever may have been said against these congresses through jealousy and ignorance, they were one of the most remarkable manifestations of the human intellect that has ever occurred on American soil,—that gigantic America, which is destined to assume from day to day a more considerable place in the world, in the evolution of civilisation, and in the destinies of the human race."

THEODORE STANTON.

PARIS, FRANCE.

CRITICISMS AND DISCUSSIONS.

SOCIAL EVOLUTION THROUGH THE ETHICAL LAW.

The lucid way in which Professor Le Conte explained the initial difficulties attending the first principles of social evolution must have come as a boon to many another puzzled student of sociology besides myself. It is impossible for an earnest believer in the great destiny of man to hold as true the gospel preached by the professed sociologists, still less possible is it for an upholder of monism to adopt their materialistic views, believing, as we do, in "the spirituality of all existence." Therefore words such as those of Professor Le Conte, in his able article on "The Theory of Evolution and Social Progress," in your issue for July, are, indeed, welcome.

There is another writer of the present day who has forsaken the ground on which the sociologists have encamped for so long, namely, Benjamin Kidd, who in his work on social evolution bears out the truth of what Professor Le Conte says of the "Wrong Direction"; he writes in his opening chapter, "The Outlook":

"Science has obviously herself no clear perception of the nature of the social evolution we are undergoing. . . . We are without any real knowledge of the laws of its life and development, or of the principles which underlie the process of social evolution which is proceeding around us."

But, on the other hand, under the heading of "Conditions of Human Progress," he says, speaking of man:

"We find him in like manner subject to laws which have governed the development of the lower forms of life, and which are merely operating in society under more complex conditions."

Those laws Benjamin Kidd calls the fundamental principles which underlie the life and development of all organic nature. In that he is merely echoing the older teaching of organic evolutionists. But again he parts company with his brother sociologists and joins issue with Professor Le Conte so far as to regard religion as a function of great import to man; he calls it "the more special and peculiar feature," for instance:

"The social system which constitutes an organic growth . . . is not the political organisation of which we form part, it is not the race to which we belong, it is

not even the whole human family in process of evolution ; the organic growth, it would appear, must be the social system or type of civilisation founded on a form of religious belief."

But unfortunately *the form* which Benjamin Kidd adopts is painfully disappointing ; he formulates a religion from which reason must be entirely eliminated, nay more, in which it is really antagonistic, and we find ourselves under his arguments once again facing the old and hopeless prospect of everlasting war between religion and science—a prospect fast being blotted out by more thoughtful pictures of both walking onward hand in hand.

Curiously enough, the professed sociologists themselves admit the backwardness of their science ; one excuse, and one only, can they find for it, and that lies in its peculiar difficulties ; but, as Professor Le Conte has said, the difficulties would disappear, provided the sociologists had set out in the right direction. Starting on wrong principles, they cannot reach a right conclusion.

Another mistake into which sociologists have fallen finds expression in the following words. Talking of the progress of man, Benjamin Kidd writes :

"As to the nature of the progress there can also be no mistake. It is at once both inevitable and involuntary, . . . one of the commonest ideas surviving from a pre-evolutionary period is that which represents the stages of man's social progress as being steps in advance consciously and voluntarily taken."

Again :

"Left to himself this high-born creature, whose progress we seem to take for granted, has not the slightest innate tendency to make any onward progress whatever."

Compare with this the words of Professor Le Conte :

"But there is another and higher factor introduced right here (for man is more than an animal), a factor distinctive of social progress, a factor which soon becomes dominant over all others, viz., the conscious voluntary co-operation of man himself in the work of his own evolution."

Man himself *seeks* the ideal, worships the pure and holy with a conscious worship, the spiritual part of him is godlike, he is "a god though in the germ."

It has always seemed to me impossible to hold the dark necessity theory and at the same time to believe in the free will of man. In his spirit he is beyond the sphere of organic evolution, which has attained its perfection in his body, and has fitted it to contain his spirit. To what spiritual excellence man might attain, is as yet unknown ; to what, if properly understood, spiritual evolution might arrive, is at present beyond our ken. We dream sometimes of man ideal and godlike. The development of his capabilities for correspondence with God by means of right evolution is the goal, the end of his race, and the law governing that right evolution is surely the ethical law, a proper knowledge of virtue, a following after holiness, an unhesitative acceptance of everything morally good and beautiful, the complete rejection at whatever cost of everything impure, corrupt, and base, all

our actions, all our thoughts, hopes, and wishes should have but one object—the furtherance of virtue. And why? Because virtue is the law of our souls' life, and, just as vegetation obeys the law of its growth, the heavenly bodies the law of their movements, elements the law of their existence, so should man obey the law of his life, only he must do so consciously, as on a higher plane, while the others obey from necessity.

Professor Le Conte mourns the slight care and thought bestowed on love and marriage. "Alas!" he says, "how little even yet does Reason control our selection in those things." It is true and the cause is obvious. Ignoring Herbert Spencer's untrue criticism upon the value of taught virtue found in his *Study of Sociology* we must insist upon the ancient Socratic axiom that virtue is capable of being taught and once having implanted in the mind of youth a right appreciation of ideal conduct then the truth of Tennyson's lines will be apparent :

"We needs must love the highest when we see it."

If we worshipped the Beautiful and the Holy would we choose as our life companions the Unholy and the Unbeautiful? And the Ethical Law itself, upon what does it rest? What shall we find governing the fourth and highest plane? "What is the end and term of all evolution?" The knowledge of God. "This is how men get to know God—by doing His will. . . . Acts react upon souls. Good acts make good men, just acts just men, divine acts divine men," says Professor Drummond. God, Heaven, and Religion lie in our hearts, salvation does not come "through this ism or that ism," through Roman Catholicism or Protestantism, not alone does it dwell in churches or chapels, but in the souls of men lies its possibility.

We must not limit the number of avenues leading up to God. Personally being amongst those who have found their highest conception of the Beautiful and Holy in the religion of Christ, yet it would be far from me to assert that such belief was the only acceptable one in the eyes of the great Father. All religions preaching love and peace, not war and bloodshed, all religions teaching man to believe in the majesty of his spiritual birth, in the greatness of his destiny, have surely in them the principles of man's social evolution. Some have doubted whether our civilisation has not introduced a greater number of evils than it has cast out. Those evils, and they are many and great, have entered because of the ignorance which prevails regarding the laws which should govern man. The realisation of the penalties incurred by the breaking of a humanly appointed law is forced upon us, but how many realise the penalties which we incur in the breaking of the laws of our life.

Christ himself tells us a little about an Ideal Civilisation, an Ideal Society, when he speaks of the "Kingdom of God." Professor Drummond in his *Programme of Christianity* takes up Christ's words regarding His kingdom and says, "the sense of belonging to such a society transforms life," it gives, he writes, "a note of universality to even the humblest works we do, a sense of comradeship, a promise of success."

Now when we look at the idea of a Society, governed by the principles of organic evolution, as the sociologists conceive it would be, it becomes so terrible that we have the late Professor Huxley saying :

" Even the best of modern civilisation appears to me to exhibit a condition of mankind which neither embodies any worthy ideal nor even possesses the merit of stability. I do not hesitate to express the opinion that if there is no hope of a large improvement of the greater part of the human family. . . . I should hail the advent of some kindly comet which would sweep the whole affair away as a desirable consummation."

Herbert Spencer thinks an adequate cause can be found for religion in the idea of ghosts and ancestor-worship, while Mr. Grant Allen somewhere describes it as a " grotesque fungoid growth."

To us religion is the key to problems connected with the soul of man which are unsolvable in any other way.

On the one hand then we have the doctrine of the Organic Evolutionists with its cruel necessities, war, strife, and oppression, on the other hand the doctrine of the evolution of the soul which for principles has love, peace, pity, generosity, and unselfishness. One promises man a glorious future, a diviner life, a noble aim ; the other places him on a level with the beasts, and thinks that destruction would be a fitting consummation for all his kind.

EMILIA DIGBY.

TICEHURST, SUSSEX, ENGLAND.

BOOK REVIEWS.

DAS DER MENSCHHEIT GEMEINSAME. Auch eine christlich-soziale Studie. By
Leopold Besser. Bonn: Emil Strauss. 1895. Pages, 119.

The utterances of this pamphlet are distinguished by considerable common sense, insight, and straightforwardness of presentation. The discussions relate mainly to Germany, but consider aspects of life and thought which are fundamental and which possess a significance for the reflective people of every nation. If not impregnable, the statement of the author's philosophical position is at least clear and simple; while in the application of his views he is eminently practical and constantly at the heart of the questions he seeks to solve. Whether his propositions are stated with sufficient definiteness to be put into immediate execution is another question, and one which is withdrawn from criticism by the fact that the author aims wholly at the formation of ideals. He contends that it is not so much the actual economic facts, such for instance as the glaring contrasts of poverty and wealth, etc., which cause the social and economic troubles of to-day, as the ideas and impulses which have hold of our brains. His purpose is to point out the way by which man can avoid falling a victim to superstition and transcendentalism, and to prevent the formation of ideas which destroy and poison the springs of life. One of these erroneous ideas is the traditional notion of religion. By "knowledge" the author understands inference from real experiences to causes which in their turn also are within the reach of real experience—i. e., perceptible by the senses; by "faith," on the other hand, he understands belief in inferences which presuppose causes *not* within the reach of experience. Now religion, man's feeling of his dependence on a power determining his life but beyond the reach of his sense-experience, belongs really in the latter category, whilst historically and actually it has been placed in the former. Hence, the innumerable clefts in human conduct and thought. Hence opposing parties have arisen whose differences can be composed only by the discovery and adoption of *Das Gemeinsame*—the common interests and the common possessions of man.

The author's discussions touching the way of practical social reform are based on the conclusions of biology, which discovers the sufficient and real ground of social existence in the triune fact of man, wife, and child as the social element of so-

ciety. The second and principal corollary of biology is the obligation devolving on parents of equipping the individual child with such capacities for labor as shall bring the rewards necessary for the maintenance of a proper human existence. To this end the family must possess property. On this point the author lays greatest stress; primarily he thinks the acquisition of earthly goods to be more necessary even than the acquisition of intellectual goods; the social question will find its solution only in the *individual reform* of the *laboring* individual. In this respect his views are opposed to communism and are centred in the idea of a high excellence of individual ability. It is the gospel of labor and *the just reward* of labor that he propounds—in which way alone man can pursue the noblest aims of life and fully participate in the common spiritual possessions of mankind—its knowledge, love, and justice.

There is a salutary and elevated vein of patriotism in the book, which is opposed to all clericalism and pins its faith on the house of Hohenzollern as having the power and the will to save Germany from its present social and spiritual distresses. The author quotes this sentence from his highest ideal of a princely ruler, Frederick the Great, as being the quintessence of all ethics and all Christianity—the real Sermon on the Mount. "Our life is a fleeting passage from birth to death. The mission of man during this brief space of time is to labor for the welfare of society, of which he is a part." One can well see that the author's words have, as he tells us, been written with "all the warmth of his heart's blood, at least with so much as age has left him" (it has left him much), and it is to be hoped that the best portion of what he has said shall neither be "decried," nor "silenced by disregard." T. J. McC.

PSYCHOLOGIE DES GLAUBENS. By *Gustav Vorbrodt*. Göttingen: Vandenhoeck & Ruprecht. 1895. Pages, 257. Price, M. 7.

This book insists upon the importance of psychology for religion. The author has unquestionably discovered the Archimedian *δός μοι πῶν στῶ* of theology, and convinced of the importance of his mission, addresses his book to the "hard-hearing" theologians, to professional psychologists, and to the enemies of religion. He has read Ribot, Binet, Wundt, and others with profit, and presents their views with fair accuracy. But while he apparently adopts some of the most striking results of modern psychology, e. g., as to the nature and origin of the ego (pp. 110-127) he retains, at the same time, some traditional notions of theological dogmatism that are irreconcilable with the new view. He goes so far as to speak of the personality of God, concerning which he says that it is absolutely independent of our planet, and it is wisest not to ponder on the subject, as it is conceivable that God's personality manifests itself under other than terrestrial conditions and in other ways. Any one who takes the allegory of God's personality seriously, will fall into gross misconceptions, which are but little less pagan than polytheism, for God is not an individual being, but is suprapersonal. God is not a great world-ego that loves his creatures, but God is (as Christ tersely expressed it) himself Love; God is not the maker of law

and order; but God is himself Law and Order. He is not the legislator of morality, but he is the eternal standard and norm of morality. We cannot enter into a detailed discussion of the problems touched upon by Vorbrodt, as this would involve a disquisition on the very basis of his faith, which, in spite of many points of contact, is hostile toward a monistic positivism, which, as all science must do, takes its stand upon facts. When we discard belief, preserving faith, which latter, in accordance with the original Greek and Hebrew terms, means character, moral strength, and confidence in moral ideals, his notion of faith appears to be "belief," and he declares that "belief is a moral duty which is rejected only by those who prefer to obey the vices of their lower ego!" (See Preface, p. xxvii.) In spite of this attitude, which is antipodic to our ideas of both science and religion, we are much pleased with the spirit of Vorbrodt's book. It indicates the awakening of thought in the mind of a clergyman, and the seriousness with which he attacks and handles the psychological problem, is the first step in the direction toward the religious ideal of the future, which we call the Religion of Science. κρς.

MONADO-MONISM, OR THE PHILOSOPHY OF EXISTENCE. By *Ram Chandra Sen*. Benares, India: Amar Press. Pages, 40.

This essay is a very compact, thoughtful, and thoroughly systematic view of evolution as seen by an Oriental savant. Students of evolution would find it deeply interesting, if not otherwise, at least as a contrast to the evolution-theories prevailing in the Occident. Not that they wholly disagree,—in fact it is possible to combine the two systems,—but that Sen's theory grounds in consciousness *ab initio*—all existence is conscious, and this fact determines the movement. R. N. F.

KANT'S ERKENNTNISTHEORIE UND SEINE STELLUNG ZUR METAPHYSIK. By *Dr. Max Apel*. Berlin: Mayer & Müller. 1895. Pages, 147. Price, M. 3.

This booklet is a criticism of Kant's position, with a view to re-establishing the metaphysicism which the great sage of Königsberg had overthrown. One instance will characterise the whole treatise. In the Fourth Part, pp. 121-128, Kant's criticism of the ego-question is discussed. Dr. Apel quotes the passages in which Kant lays down the emptiness of the ego-conception that accompanies all thought, and contrasts this assertion with another statement of Kant's in which the ego is said to be consciousness, pure and simple, but *not* a species either of conception (*Vorstellung*) or perception (viz., *Anschauung*). In the second paralogism Kant presents as an argument in favor of the ego as a metaphysical unity of the subject, the proposition that if all the separate words of a verse are distributed among several persons, their isolated thought can never constitute the verse. In order to have the whole of a thought, it must become conscious in a substance that is simple. This argument Kant rejects by saying that any argument that proves the unity of thought proves only the presence of a collective unity and never an absolute unity of the subject. In Dr. Apel's opinion the evidence in favor of the absolute unity is valid;

he censures Kant for applying to the psychic life the categories of physics. Therefore, in spite of Kant, he accepts as an analytical proposition the idea that "thought can only be the effect of an absolute unity in the thinking being."

In a similar way, Dr. Apel attacks the most important results of the *Critique of Pure Reason*, diligently quoting the most apposite passages and taking issue with the critical verdicts of Kant. Although the author frequently misses the right solution, we find that his booklet is suggestive and well written. κρς.

THE GOSPEL OF BUDDHA. According to Old Records. Told by *Paul Carus*. Third, Revised Edition. Chicago: Open Court Publishing Co. Pages, 275. Price, Cloth, \$1.00; Paper, 35 cents.

Within nine months from the publication of the first edition of this work, the issue of a third has been found necessary, and translations of it have appeared in German and Japanese and are being prepared in French and Chinese. It has been very favorably received in Oriental countries, having been introduced as an English reader in Buddhist schools of Ceylon, and has met with no less favorable comment in Christian quarters. This is no doubt due to two facts—first, to its method of treatment, which is that of presenting the actual and original contents of Buddhism as they are found in the Buddhistic canon itself, and secondly, to the purpose of the author, which has not been to stir up animosities between Christianity and Buddhism, but to enable both to sound more deeply and to grasp more clearly the spirit and meaning of their faiths. He has expressed his agreement, here, with the words of Max Müller, cited by a reviewer: "If I find in certain Buddhist works doctrines identically the same as in Christianity, so far from being frightened, I feel delighted, for surely truth is not the less true because it is believed by the majority of the human race."

The book presents "a picture of a religious leader of the remote past with the view of making it bear upon the living present and become a factor in the formation of the future." The majority of the passages which make up the work are literally copied from translations of the original texts; some have been modernised, others rearranged, and others abbreviated. The author himself has limited his original work to the Introduction and Conclusion, and to a few passages designed as illustrations, but all conceived in the original Buddhistic spirit. A valuable table of reference, where the reader can find the sources and the parallelisms of the Buddhistic doctrines with Christianity, a full pronouncing glossary of names and terms, and an exhaustive index have been added—all features of incalculable usefulness. ψ.

THE TEACHING OF THE VEDAS. What Light Does It Throw on the Origin and Development of Religion? By *Maurice Phillips*. London and New York: Longmans, Green, & Co. 1895. Pages, 232.

The purpose of this book is "to answer two questions, viz., (1) what is the fundamental teaching of the Vedas? and (2) what light does that teaching throw

"on the origin and development of religion?" There are five chapters treating respectively of the literature, theology, cosmology, anthropology, and soteriology of the Vedas. What the spirit and character of the work are—and they are not necessarily explained by the author's being a missionary—may be judged from conclusions such as the following: "That the development of religious thought in India "has been uniformly downward, and not upward—deterioration, and not evolution; . . . that, if we could go back far enough in time, so as to reach the point "whence the deterioration began, we should find a monotheistic religion, pure and "simple; . . . that the higher and purer conceptions of the Vedic Aryans were the "results of a Primitive Divine Revelation"—a sort of survival or reminiscence. Further, "the theory of a Primitive Divine Revelation alone is capable of explaining all the religious ideas of the Vedas, such as an object of worship, sin, mercy, "sacrifice, a future state. These ideas are all foreign to Nature. Sun, moon, "earth, mountains, and rivers, have nothing to do with worship, with forgiving sin, "and with preserving men from guilt. But they are quite at home in the theory "of a primeval revelation. We must believe that the most probable theory is that "which explains all the facts. The theory of Natural Evolution cannot explain all "the facts. But the theory of a Primitive Divine Revelation, whatever hard words "may be said about it as being unscientific, does explain all the facts. It tells us "that the presence of such ideas in the Vedas as God, confession of sin, petitions "for mercy, sacrifice, and a life after death, are relics of a vanishing Revelation, "held mechanically, without any comprehension of their meaning. Granting that "this is only a theory, the opposite view is no more. Between these two theories "there is, however, this difference. The one is in harmony with the teaching of a "venerable old Book, against which no weapon formed has yet prevailed; the other "is in opposition to it."

These quotations are enough to characterise the book.

μ.

DUALISM AND MONISM AND OTHER ESSAYS. By *John Veitch, M. A.* With an Introduction by R. M. Wenley, M. A. Edinburgh and London: William Blackwood & Sons. 1895. Pages, 221. Price, 4s 6d net.

The present collection of posthumous writings by the late Prof. John Veitch of the University of Glasgow consists (1) of an essay of one hundred and sixteen pages entitled *Dualism and Monism, or, Relation and Reality*; (2) of an essay which was intended as part of a work more extensive in scope and embodying a history of the leading doctrines of the Greek philosophy with special reference to the theory that the history of philosophy is a record of "progress by antagonism"; and (3) of an essay on Wordsworth which is reprinted from *Wordsworthiana*. The first essay forms the complement of a former work by Professor Veitch entitled *Knowing and Being*, where he criticised the Absolutist view of the world, or "the doctrine that a series of relations summed up in the phrase 'an Absolute or Infinite Self-conscious Ego' is convertible with Reality." In the present volume he deals with what he

regards as a form of the individualistic view, viz., "that mere relations, or a collective sum of relations in something regarded as the individual consciousness, are also so convertible,"—a theory which seems to him as inadequate as the former. The discussion, which is an able and clear presentment of an important metaphysical problem, is conducted in the form of a criticism of M. Lionel Dauriac's book *Croyance et réalité*, selected by Professor Veitch as one of the clearest and best expositions of the individualistic view. The third essay on *The Theism of Wordsworth* is an interpretation of certain philosophical implications of Wordsworth's poetry and is marked by rare insight. It is reproduced as a specimen of Professor Veitch's constructive writing. Mr. Wenley, the editor, has added a brief but thoughtful introduction of thirty pages on Professor Veitch's position in philosophy, in which he has admirably characterised the teachings and personality of the man. A list of Professor Veitch's works is also given. μκρκ.

DIE GRUNDFRAGE DER RELIGION. Versuch einer auf den realen Wissenschaften ruhenden Gotteslehre. By Dr. Julius Baumann. Stuttgart; E. Hauff. 1895. Pages, 72. Price, M. 1.20.

The idea which Professor Baumann has propounded in this pamphlet was indicated in a former book, entitled *The Facts Which Lie at the Foundation of a Scientific View of the World and of Life*. His contention is that the results of natural science leave ample room for a scientific conception of God, but that we are prevented from reaching such a conception by a habitual tendency of the mind to idealise all notions of divine existence. His treatment falls under four heads: first, he discusses religion generally; secondly, he considers whether religion is subjective or objective; thirdly, he reviews and epitomises the development of the Christian religion as presented in Harnack's *History of Dogma*; and fourthly, he gives his own attempt at establishing a theory of God, which shall be based upon the real sciences, that is, shall be objective. His conclusions on the first and second scores are: that religion in all its forms shows a common and universal impulse to higher aims, but that despite its common traits, in its historical and traditional forms it can only offer subjective truth, that is, each religion necessarily appears to itself as the only true one. His own attempt, which claims the excellence of being free from all idealisations of the heart and will, sees in God an absolute, unitary cause which is spiritual in its essence. He bestows upon his views the appellation "scientific," because they proceed from facts, involve no self-contradictions, and revert in all their developments to facts. This so-called scientific religion, of which Professor Baumann here gives the outlines, is claimed to be the outgrowth of the present status of science, and has its affinities in the natural or rational religion of Aristotle, Leibnitz, and others. Its relation to the Christian religion is explained by reversing the advice of Augustine: "Go not without, but turn within thee; in the inward man lives truth," into the following maxim: "Turn without as much as thou possibly canst; for all inward thoughts have no other guarantee than that of

pure subjective creations, until they have been verified from without," etc. Many of the points of the pamphlet are well made and have the rare virtue of brevity.

μκρκ.

UNTERSUCHUNGEN ÜBER DIE VERSCHIEDENEN MORALSYSTEME. By *Dr. Karl Alexander Leimbach*. Fulda: Fuldaer Actiendruckerei. 1894. Pp. 125.

Not all conduct is included, at least obviously, under the moral law; in doubtful cases, where conduct is left to man's free choice, rules are needed rendering sure ethical decisions possible. Bodies of rules of this kind are called ethical or moral systems, and they have been proposed in various forms and numbers in the history of religious philosophy. Dr. Leimbach has undertaken in this work to investigate the philosophical foundations of such systems, as they have been wrought out in the Roman Catholic theology, and from the point of view of that theology, with a view of finding some solution of the questions at issue, and of selecting from the various systems proposed one which shall meet the exigencies of all cases. He reviews the doctrines of tutorism, probabiliorism, æquiprobabilism, laxism, and finds ultimately in the system of probabilism along with tutorism the most truth and logical rigor. The doctrines recommended have found, he says, their highest exemplification in the life of St. Alphonsus.

υ.

OUTLINES OF SOCIAL THEOLOGY. By *William DeWitt Hyde, D.D.*, President of Bowdoin College. New York and London: Macmillan & Co. 1895. Pages, 260. Price, \$1.50.

The President of Bowdoin College has sought in this little book "to point out the logical relations in which the doctrines of theology will stand to each other when the time shall come again for seeing Christian truth in the light of reason and Christian life as the embodiment of love." The Greek Church, he says, "put a metaphysic in the place of religion, and paid the penalty in spiritual sterility." The Latin Church put authority in the place of reason, and paid the penalty in intellectual barrenness. Protestantism has inherited the Greek formulas without the philosophy which gave them meaning, and the Latin distrust of reason without the authority which made dogmatism effective. The remedy lies in a "reunion of vital religion with rational theology." He has called his book Social Theology, "because the Christianity of Christ and his disciples was pre-eminently a social movement, and because we are looking at everything to-day from the social rather than the individualistic point of view." There is much spiritual insight and considerable appreciation of the broader phases of the religious problem in President Hyde's book. In the interpretation of some dogmatic notions he shows impartiality, and, what is rarer, common sense. But the book is not altogether free from a certain technical theological bias, which appears, for instance, in the rather summary proof of the divine personality and in the author's definition of what constitutes Sonship of God.

μκκκ.

FRIEDRICH EDUARD BENEKE. *THE MAN AND HIS PHILOSOPHY*. An Introductory Study. By *Francis Burke Brandt, Ph.D.* New York: Macmillan & Co. Berlin: Mayer & Müller. 1895. Pages, 167. Price, \$1.00.

Mr. Brandt's study is the fourth number of the Columbia College Contributions to Philosophy, Psychology, and Education, the purpose of which we have mentioned before in *The Monist*. The study gives a biography of Beneke and a relatively complete analysis of his philosophy. Its underlying thought, which is rather novel, is that "the true development after Kant (of the German idealistic "philosophy) is to be found, not in Fichte, Schelling, and Hegel, but in the philosophical system of Friedrich Eduard Beneke, . . . in other words, that in the "philosophy of Beneke we have both in outcome and in method the profoundest "metaphysical insight of our century,"—a claim which Mr. Brandt properly characterises as a bold one, but which he believes the evidence of his pages will justify. As Beneke has been much neglected, curious students of philosophy will find, perhaps, in this monograph of Mr. Brandt the completest account of his philosophy in English, although we may remark that a discussion of his psychology was given in a large work on *Occult Phenomena*, published some five or six years ago by Dr. Raue of Philadelphia. μκρκ.

THE PROPHETS OF ISRAEL. Popular Sketches from Old Testament History. By *Charles Henry Cornill*, Doctor of Theology and Philosophy, and Professor of Old Testament History in the University of Königsberg, Germany. Frontispiece, Michael Angelo's Moses. Chicago: The Open Court Publishing Co. 1895. Pages, 200. Price, \$1.00.

No branch of science, in the last century, has undergone such a profound revolution as that of Old Testament research. In the place of the traditional representation of the religious history of Israel has been substituted a rigorous historical mode of view, which discovers in the process in question an organic development, and assigns to each isolated event its natural position in the whole, and by reference to this whole comprehends and explains each event. At first, even professional scholars received this organic view of the Old Testament with distrust and repugnance; for it was no light task to abandon a position that for two thousand years had subsisted as the absolute truth. But by that intrinsic power of conviction which always inheres in the truth it gradually assumed increasing dominance in men's minds, and has, particularly since the brilliant and fascinating exposition of Wellhausen's *History of Israel* of the year 1878, been borne onwards in an uninterrupted and irresistible career of triumph.

For no part of the Old Testament literature has this change of view been more significant and momentous than for the prophets, whose real significance could only now be understood and properly valued. Whilst according to the traditional view the prophets merely broadened and deepened in single points the religion of Moses, which was regarded as a complete and finished system, it now appeared

that the prophets had completely revolutionised the religion of Israel, that it was wholly through them that the national religion founded by Moses became the religion of the world, and that they prepared and fitted the religion of Israel to become the parent of Christianity.

Truths of such importance, and so recently acquired, concerning things which affect every man's dearest interests, should not be restricted to a small circle of scholars, as if constituting an esoteric doctrine; but every educated man and woman has a right to hear of and to know about them. This is the purpose which this little book is designed to serve. It presupposes no special knowledge, but seeks to give a popular presentation of its subject-matter, by explaining first the nature and import of Israelitic prophecy, indicating what in Israel's own view a prophet was, how this phenomenon is to be explained, what position it occupies in the history of the religion of Israel, what its presuppositions are, and in what manner, thus, it sheds light on the period of time preceding it. To this is added an attempt at a historical valuation of Elijah, who occupies in so far a place apart as we possess nothing written from him. Next, the productions of the prophetic literature of Israel which have been preserved are examined in the chronological order established by Old Testament inquiry as the result of profound and laborious research. The historical conditions and the contemporary environment of the various prophets are portrayed, their significance, their peculiar original achievements briefly characterised, and finally the attempt made to assign and establish for each prophet in the developmental process of the religion of Israel his logical and organic position—in what respect his influence was promotive, and in what respect reactionary; so that the little book may be viewed as a brief sketch, presenting only the salient and important outlines, of the religious history of Israel from Moses down to the time of the Maccabees.

AUTHOR'S ADVERTISEMENT.

THE MESSAGE OF MAN. A Book of Ethical Scriptures. Gathered from many sources and arranged by *Stanton Coit*. London: Swan Sonnenschein & Co. New York: Macmillan & Co. 1895. Pages, 323. Price, \$1.75.

"Inquire not who spoke this or that, but attend to what is spoken." In conformity with this idea, Mr. Coit has obliterated as much as possible, in the compilation of this ethical anthology, the individual traits and circumstances of the sources from which he has drawn his materials, and has sought to weld the old and the new together under fresh relations, applying to all the varied exigencies of modern life. After stating that the writings of the past are for us only sands from which each must gather out the gold-dust, he says: "But when, with no solicitude except to be faithful to his own personal want and sense of truth, the compiler has gathered the best utterances—the best for him—concerning the Moral Life of Man, he finds that he has stored up something more than a mere heap of unrelated particles even of gold, he discovers that the thought-edges of one saying match with those of another, and the emotional flush of one mounts into the warmer glow of another, as if each

had been made for each." Many think that a thought loses its life when torn from its organic context, and it is certainly true that the weight and significance of an utterance for us depends much upon when and how it was said. Some sayings in the religious and secular literature of the world have a universal and eternal value like the formal truths of mathematics; by their very nature they contain, in abstract, symbolical formulae as it were, the condensed results of large social and ethical experience. But there are other utterances, of weight and power, too, which receive their coloring from the time and the things to which they were applied; if we take these in their literal tenor, and as applying in full force to the conditions of the present, we are apt to form narrow or extravagant judgments, and our actions will suffer accordingly. For persons who feel thus, as for those whose bibliographical tendencies are uppermost in character, and these form the larger number, Mr. Coit has supplied a general index and an index of authors and editions, giving accurately all his sources. The selections are beautiful, and, as a rule, appropriate, although in some few cases, of course, they illustrate the compiler's own opinions on modern questions, and not those of all impartial thinkers. All the best books of the world's literature have been turned to account in the compilation. μ .

L'ÉDUCATION. By *F. Picavet*. Paris: Léon Chailley. 1895. Pages, 232. Price, 4 francs.

La Vie Nationale is the title of a new library of social and political sciences, published by Léon Chailley, Paris, of which M. Picavet's work is the fourth volume, the three former being on *Politics*, *Commerce*, and the *Social Question*. M. Picavet has given us a very interesting and graceful little book, from which one can gain a clear picture of educational matters in France, without the expenditure of much time or labor—such a picture as every one should have who wishes to understand the history and significance of a country. The book is divided into three parts: (1) "The Past," consisting of a historical sketch of the old attempts in the direction of national education; (2) "The Present," consisting of a review and criticism of the present organisation, which, according to the author, lacks unity and cohesion; and (3) "The Future," where advisable reforms are pointed out. μ .

A COMPANION TO PLATO'S REPUBLIC. By *Bernard Bosanquet*. New York: Macmillan & Co. 1895. Pp. 439. Price, \$1.75.

The idea of writing a companion to Plato's *Republic* was suggested to Dr. Bosanquet by Mr. Walter Leaf's *Companion to the Iliad*, and by his experience of the intense desire for a closer knowledge of Plato felt by many students who could read him in a translation only. Philosophy loses sorely by translation, and commentary, Dr. Bosanquet thinks, can do much to restore its real meaning. He has made no attempt at textual criticism, but has simply endeavored "to bring home to English readers or to novices in Greek the sort of interpretation which a tutor at Oxford or Cambridge would probably lay before his pupils." The translation to which the

Companion is adapted is that of Davies and Vaughan, in Macmillan's Golden Treasury Series, which the commentator characterises as scholarlike and trustworthy, and of a size and cost that make it universally accessible. The book is made up (1) of a brief introduction, discussing the history and thought of the times, the life and philosophy of Plato, the domestic life of the Greeks, and the structure of the *Republic*; (2) of the commentary, following the natural divisions of the *Republic* as given by Jowett, where the translation is referred to by page and line; and (3) of a good Index. Vaughan's translation of the *Republic* consisting, it would seem, of three hundred and seventy pages, while this Commentary takes up four hundred and sixteen, one is at first tempted to think that the matter has been overdone. But no one who knows the difficulties and the vast extent and suggestiveness of Plato's thought will on this account be led to judge harshly of the commentator's work; for the careful study of one thinker as a means of philosophical education is more essential and fruitful than the same study and time distributed among many. "Beware of the man of one book."

μκρκ.

THE MELANCHOLY OF STEPHEN ALLARD. A Private Diary. Edited by *Garnet Smith*. New York and London: Macmillan & Co. 1895. Pages, 305. Price, \$1.75.

The Melancholy of Stephen Allard is a work of more than common merit. Its author was a young man of a retiring, despondent disposition, not possessing the least trace of that aggressive energy which is necessary for success in the world, but an indefatigable student, and a man of profound literary and intellectual sensibilities. The secret of his sad condition seems to have lain in a species of intellectual epicureanism. Unknown and disregarded by the world about him, lost already to others in the undistinguished crowd, he labored to lose himself. "Ignored, "I sought in turn to ignore myself. Whensoever I was released from toil, I drugged "consciousness of personality with the opiates of literature." In another place he says: "I am weary, weary of thought." Speaking of others like himself he says: "To be a man is to be self-conscious; and to be self-conscious is to be diseased. "They that are splendidly diseased, they whose disease is further complicated with "the disease of genius, imaginatively incarnate health and harmony, and are not "altogether hapless, since their melancholy is not impotent." The Diary was never intended for publication it seems, and in giving it to the world the editor has self-confessedly transgressed his dead friend's intention. The book is something in the style of Amiel's Journal, but of course does not reach the power and insight of the latter work. The author discusses all the important problems of life in a unique and broad spirit, albeit saddened and hampered by the prevailing disposition of his mind, and shows an acquaintance with thought and literature which for his years is certainly rare. Such a book, being wholly disconnected in subjects and development, should have been supplied with a good index. The editor's marginal analyses, however, help somewhat.

T. J. McC.

BIOLOGICAL LECTURES DELIVERED AT THE MARINE BIOLOGICAL LABORATORY OF WOOD'S HOLL. Summer Sessions of 1893 and 1894. Boston: Ginn & Company. 1894 and 1895. Two volumes, pages, 242 and 287.

The Marine Biological Laboratory of Wood's Holl, Mass., which is now in the sixth year of its existence, differs from its European models and precursors in the respect that it combines the functions of a research laboratory with those of a school; being designed to supplement the work of the biological department of the American high schools and colleges, while serving at the same time as a scientific centre for original investigation. It is a co-operative organisation, depending in no way upon government or sectional aid for its support but wholly on private munificence, and drawing its means and its recruits from a large and truly national association of one hundred and thirty-one colleges, universities, seminaries, academies, schools, and laboratories. So far, the success of the institution has been highly satisfactory, as is evinced by the original work and publications of its members and students, but especially by the two volumes of biological lectures before us, delivered by the teachers and investigators of the laboratory during the years 1893 and 1894. The main work of the laboratory is devoted to the general courses in zoölogy and botany, and particularly to the technical training preparatory to investigation and to the special instruction and guidance of beginners in investigation. But in these lectures, which may be regarded in some sort as the *Proceedings* of the institution, a different side of the work is presented—that of the investigators, who undertake here to review the field, and to set forth the results, of their own special labors in succinct and general terms. The lectures deal chiefly with the *unsettled* problems of the day; but a number are also concerned with the philosophical and historical aspects of biology. Thus, under the first head we have the following large list: "The Mosaic Theory of Development," by E. B. Wilson; "The Fertilisation of the Ovum," by E. G. Conklin; "On Some Facts and Principles of Physiological Morphology," by J. Loeb; "On the Nature of Cell-Organisation," by S. Watasé; "The Inadequacy of the Cell-Theory of Development," by C. O. Whitman; "Bdellostoma Dombeyi, Lac," by Howard Ayers; "The Influence of External Conditions on Plant Life," by W. P. Wilson; and "Irrito-Contractility in Plants," by J. Muirhead Macfarlane (in the volume for 1893), and "The Differentiation of Species on the Galápagos Islands and the Origin of the Group," by G. Baur; "The Embryological Criterion of Homology," by E. B. Wilson; "Cell-Division and Development," by J. P. McMurrich; and "Origin of the Centrosome," by S. Watasé (in the volume for 1894); and under the second head such articles as the following: "Dynamics in Evolution," by J. A. Ryder (1893); "A Dynamical Hypothesis of Inheritance," by J. A. Ryder; "On the Limits of Divisibility of Living Matter," by J. Loeb; "The Hereditary Mechanism and the Search for the Unknown Factors of Evolution," by H. F. Osborn; "The Problems, Methods, and Scope of Developmental Mechanics," by W. Roux, and the highly erudite articles of Prof. C. O. Whitman on "Evolution and Epigenesis,"

"Bonnet's Theory of Evolution," and "The Palingenesis and the Germ Doctrine of Bonnet" (1894). Besides these there are descriptive and professional lectures, such as that on "The Marine Biological Stations of Europe," by Bashford Dean (1893), and one on "The Organisation of Botanical Museums for Schools, Colleges, and Universities," by J. M. Macfarlane (1894).

The citation of the foregoing titles amply suffices to mark the scope and aims of the publications of the Laboratory at Wood's Holl. They are by the foremost investigators of America and give the results of the latest thought and research in the special fields of biological science. It goes without saying that they should receive the support of a large sale, and that the work of the institution itself should be encouraged by attention and by practical financial assistance. The lectures are finely illustrated and well printed in large, clear type and on good paper. μ.

POPULAR SCIENTIFIC LECTURES. By *Ernst Mach*, Formerly Professor of Physics in the German University of Prague, now Professor of the History and Theory of Inductive Science in the University of Vienna. Chicago: The Open Court Publishing Co. 1895. Pages, 313. Price, \$1.00.

In these days of spiritual and intellectual ferment, which is percolating even into the lowest strata of society, the scientific inquirer can have no higher ethical mission than the popularisation of the results of his science. For by whatever motives the search for truth is primarily actuated, in the end its value must be measured by its bearing on our life, ideals, and destiny. "We never know anything truly," an eminent philologist has said, himself a proficient in this art, "unless we can make it as clear as daylight to the commonest understanding"; and the example of an Euler and a Lagrange has attested this truth even in that most incredible of sciences—mathematics.

The populace, then, at least such of them as have emerged from the rabble stage, have some hope. And if that hope had never been consummated by the beautiful literature which all English readers have at their command in the works of Faraday, Tyndall, Huxley, and others, it would certainly have been carried forward a goodly way to its fulfilment by the simple and pleasing discourses which Professor Mach has given us in the first and largest part of his *Popular Scientific Lectures*, now collected into a volume for the first time. The subjects treated bear such titles as "The Forms of Liquids," "The Fibres of Corti," "The Causes of Harmony," "The Velocity of Light," "Why Has Man Two Eyes?"—all questions which are peculiarly adapted for popular presentation and which show admirably the relations of the different sciences to one another and their bearing on the practical problems and business of life. All offer advantageous points of view, and not a few, for example those on "The Forms of Liquids" and "On Symmetry" are the original presentation of new and important ideas. An article on "The Fundamental Concepts of Electrostatics" presents and explains the metrical notions which have made us masters of the difficult field of electricity.

Not less valuable is this book for the philosopher, student, and scientist, who will find here all of Mach's uncollected writings on the theory and methods of science. There is the acute essay on the "Conservation of Energy," which is a re-elaboration of the paper of 1872 on the "Conservation of Work"; the memorial address delivered before the Vienna Academy of Sciences on the "Economical Nature of Physical Inquiry," where the author has expounded his well-known theory that science is essentially an economy of thought; the inaugural address delivered on assuming the rectorate of the University of Prague, "On Transformation and Adaptation in Scientific Thought," where the ideas of Darwin are applied to explain the mode of development of science, and lines of thought are followed which closely resemble the later views of Romanes and Lloyd Morgan; and lastly Professor Mach's latest address, delivered before the German Society of Naturalists and Physicians in the autumn of 1894, "On the Principle of Comparison in Physics." Here the sweeping philosophical significance of Kirchhoff's classical definition of mechanics is set forth, and the goal of all scientific research exhibited in the clearest and most unmistakable terms. The whole forms a complete survey of the ultimate import and aim of science from points of view which it would be difficult to simplify, and which go far to rid science of its mystical and metaphysical appendages. As we see, the book seeks to accomplish, at both ends of science, that simplification on which its ideality and utility both depend. The volume closes with a discussion of the relative merits of the classics and the sciences as a means of education. ♣.

LEHRBUCH DER PSYCHOLOGIE. By *W. Volkmann*. Two volumes. Fourth Edition. Cöthen: O. Schulze. 1894—1895.

Volkmann's *Text-book of Psychology* enjoys a high reputation both at home and abroad. When it first appeared in 1876 as the enlargement of the author's *Outlines*, Professor Schaarschmidt in the *Philosophische Monatshefte* characterised it as "an excellent work—unquestionably the most competent, and in a scientific regard the most important, compendium of contemporary psychology which we have." Ribot expressed himself to the same effect in the *Revue Philosophique*, and a critic of the *Westminster Review* uttered the hope, which has not yet been fulfilled, of seeing the work in an English translation.

The praise accorded to this work is the more significant as it comes mainly from quarters which do not represent the Herbartian point of view of Volkmann. The success which the book met with was due to the solid equipment of its author and to its splendid elaboration of details. It consisted, and still consists, of what may be called a dogmatic part in which the author sets forth his doctrines in succinct and carefully weighed terms, and of a historical part in which he critically expounds the various historical attempts at solving the problems of psychology, often accompanying his elucidations with exhaustive remarks. These historical comments have been highly commended. Ribot has praised them, saying: "Their erudition is immense, as those who have used the book must fain admit. All the

psychological doctrines from India and China to the most modern German, English, French, and Italian works are placed under contribution." William James says in his *Principles of Psychology*: "The bibliography of W. Volkmann's *Lehrbuch der Psychologie* (1875) is so complete, up to its date, that there is no need of an inferior duplicate."

Unfortunately the praise accorded to the edition of 1875 is not due to the present work, at least without qualification. The present edition, like the third of 1886, has been edited by Professor Cornelius of Halle, and, apart from a few stylistic changes, again gives the expositions of Volkmann in unaltered form. No fault, of course, is to be found with this last procedure, but the case is different with the references to the literature. The citations are incomplete from 1875 on, and not well arranged—a defect which considerably diminishes the usefulness of the book for the great majority of readers. Particularly is the foreign literature meagre, and also the choices are very poorly made. For example, the important writings on child psychology of Compayré, Baldwin, Tracy, Shinn, and Romanes are lacking altogether. Only the first part of Pérez is mentioned in the list at the end of the second volume, and of Sergi's results only a small book of pedagogical interest. Of Galton only one article from a review is catalogued, and of Binet also only one article from the *Revue des Deux Mondes*. On the other hand we meet with many writers of subordinate importance whose reception in a work of the rank of Volkmann's is unintelligible.

The present form of Volkmann's work is characteristic of the present situation of the Herbartian psychology in Germany. This psychology has made no notable advances in the last twenty years owing to the lack of men willing or competent to make use of the results of recent research; nor is any improvement in this direction to be expected. The old-time leaders, Drobisch, Strümpell, and Robert Zimmermann, have grown old and lack the requisite powers of assimilation; Theodor Vogt and Otto Willmann have applied themselves exclusively to pedagogical questions, where the neglect of psychology is already beginning to have serious effects. The only man of whom there is any possible hope is Otto Flügel, who is no longer young, and who will probably confine his work henceforward to the periodicals.

C. UFER.

ON SENSATIONS FROM PRESSURE AND IMPACT. With Special Reference to the Intensity, Area, and Time of Stimulation. By *Harold Griffing, Ph. D.* New York and London: Macmillan & Co. Pages, 88. Price, 75 cents.

Mr. Griffing's thesis constitutes the first number of the new series of *Monograph Supplements* issued by the *Psychological Review*. The series has certainly started well. It does not lie within our sphere to offer either a criticism or an encomium of Dr. Griffing's methods and results. We can simply state that it is his object to "discuss systematically the relations existing between the intensity, area, and time of dermal stimuli, and the resultant sensations and perceptions," and to

mention as one of his more important results that "Weber's law holds approximately for weights greater than 100 to 500 grammes, while for low intensities the probable error increases much more slowly than the stimulus." μ.

THE DISEASES OF PERSONALITY. By *Th. Ribot*, Professor of Comparative and Experimental Psychology in the Collège de France. Authorised Translation. Second Revised Edition. Chicago: The Open Court Publishing Co. 1895. Pages, 163. Price, cloth, 75 cents; paper, 25 cents.

The translation of this edition has been carefully revised throughout and embodies all the additions and corrections of the latest French edition, besides the rectification of a number of important errors heretofore overlooked. The references and footnotes have been reverified where possible, and the English citations given in the words of the originals. A complete analytical index, the lack of which so impairs the usefulness of most French and German works, will greatly enhance the value of the book both for purposes of reference and of study. It is to be remarked that the method and points of view of the work are substantially what they were in the first edition; for it is Professor Ribot's opinion—and this is important—that although the new researches in provoked alterations of personality, e. g. hypnotism, possess much significance, yet the spontaneous alterations, which form the main material of his book, still furnish the solidest data for the study of the morbid manifestations of personality. †.

DIE LOKALISATIONSTHEORIE ANGEWENDET AUF PSYCHOLOGISCHE PROBLEME. Beispiel: Warum sind wir zerstreut? By *Georg Hirth*. Munich: G. Hirth's Verlag.

DIE MEHRHEIT GEISTIGER PERSÖNLICHKEITEN IN EINEM INDIVIDUUM. By *Dr. S. Landmann*. Stuttgart: Ferdinand Enke.

The author of the attractive little work first mentioned here is an associationist and seeks to show how the normal ego-consciousness is formed by co-operation of the separate centres of the cerebral cortex, while under the influence of sense-perceptions. But since the different fields of the cortex (the author calls them *Merksysteme*, or memory-groups) are not equally powerful, they do not always furnish their quota to the ego-consciousness; it may happen, in fact, that the ego-consciousness resides only in one memory-group. As we see, the author skirts very closely here Charcot's doctrine of types. Frequently, owing to unusual endowment, or owing to occasional change of circumstances, no perceptive system at all is aroused into activity; the conscious condition is then in itself the basis of absent-mindedness.

Strongly noticeable as Meynert's influence is in Hirth, it is still more so in Landmann's book. Like Meynert, Landmann also emphasises the two-fold activity of mind—viz.: its *conscious* and its *unconscious*, or better, *subconscious*, activity. The latter is the original activity and has its seat in the sub-cortical centres of the

cerebral trunk; while the first has its organ in the cerebral cortex, where it transforms the sense-perceptions, feelings, and emotional impulses originating in the sub-cortical centres into conscious images and applies them to its further uses. In deep sleep, and in hypnosis, the author says, the whole cerebral cortex is unable to perform its functions; consequently the ego sleeps and only single sub-cortical centres are active. Man, however, has no knowledge of this activity and no subsequent memory of it. When the cerebral cortex is performing its functions, ego-consciousness exists. But the function may be associated at different times with different isolated portions of the cortex, so as not to be always the same. According as this or that part of the cortex is awake, this or that ego is present. Such, in fact, is the case in many morbid conditions. To-day, for example, the diseased subject is a Frenchman who does not know German. To-morrow he is a German and learns French with difficulty. The author adduces many instances of this kind and endeavors to explain them by his theories.

C. UFER.

PSYCHOLOGIE DU MILITAIRE PROFESSIONNEL. By *A. Hamon*. Paris: Bureaux de la revue socialiste, 10 rue Chabanaïs. 1894. Price, fr. 3.50. Pages, 216.

The title of this work is slightly a misnomer. The book is not a psychology of the professional soldier, but a collection and exploitation of facts going to show that the armies of the great military nations of Europe are sinks of vice and crime. It is in line with the work of the new peace-leagues which finds one of its ablest exponents in Baroness Suttner. The book is in its fifth thousand, and is dedicated to Dr. A. Corre, from whom we have also received a pamphlet, entitled "Militarisme," devoted to the exposition of the same subject.

M.

THE GAIN OF LIFE, AND OTHER ESSAYS. By *William Chatterton Coupland*, D.Sc., M. A. London: T. Fisher Unwin. 1890. Pp. 285. Price, 6s.

Mr. Coupland's work is so well known that a critical notice of it now may appear belated. We shall therefore merely say, for the benefit of our American readers to whose notice the book may not yet have come, that Mr. Coupland, who is the translator of Von Hartmann, and the author of *The Spirit of Goethe's Faust*, has here thrown together in a popular form, marked by high literary and exegetical qualities, his thoughts on the problems of Optimism and Pessimism. The title of the book reminds us of Dühring's *Der Werth des Lebens*, though our author's conclusions are perhaps not so positive as Dühring's. It is well to see the idea of consciousness as pain emphasised. As to the scientific importance of the spiritistic movement, we differ from the author; but this is beside the question. The main weight of Mr. Coupland's argument is for progress; so that his predilection for pessimism may be overlooked. Appended to "The Gain of Life" are five disconnected essays entitled: "The Value of Speculative Hypotheses," "Henry Thomas Buckle," "Creation and Criticism," "Laon and Cythna," "An Evolution Rhapsody."

M.

PERIODICALS.

THE PHILOSOPHICAL REVIEW. Vol. IV. No. 4.

THE ABSOLUTE AND THE TIME-PROCESS. By *Prof. John Watson*.—THE ETHICAL SYSTEM OF RICHARD CUMBERLAND. By *Dr. Ernest Albee*.—HYLOZOISM. By *Prof. W. A. Hammond*.—THE THEORY OF INFERENCE. By *William W. Carlile*.—BOOK REVIEWS.—(Boston, New York, Chicago: Ginn & Co.)

Professor Watson thinks that "there are clear indications that the reign of Agnosticism is almost over," and that the current discussions regarding the nature and knowability of the Absolute are not only seasonable but needed. His article has the form of a criticism of Mr. Bradley and Mr. McTaggart's views of the "Absolute in the Time-Process," and his own view, which is that of an Absolute which manifests itself in the Time-Process, yet is self-complete, is stated as follows: "The Absolute must be self-distinguishing and yet self-relating. . . . No process of knowledge or action can ever bring the human mind to a stage in which reality will present itself as other than that of the unity of subject and object, which is the only reality we are capable of knowing."

The considerations advanced by Mr. W. W. Carlile in "The Theory of Inference" are worth reading.

The Philosophical Review issues a "Supplement" to its June number consisting of the continuation of Dr. Erich Adickes's German Kantian Bibliography, which has been running in the *Review* for many months back. Another instalment will be issued bringing the Bibliography down to the date of Kant's death, 1804. The completeness and tremendous extent of this Bibliography leave nothing to be desired. Free to subscribers to the *Review*; sold separately, 75 cents.)

THE PSYCHOLOGICAL REVIEW. VOL. II. Nos. 4 and 5.

THE PSYCHOLOGY OF PAIN. By *C. A. Strong*.—EXPERIMENTAL INDUCTION OF AUTOMATIC PROCESSES. By *W. R. Newbold*.—WELLESLEY COLLEGE PSYCHOLOGICAL STUDIES: directed by *Mary W. Calkins*. I. Dr. Jastrow on Community of Ideas of Men and Women: *Cordelia C. Nevers*. II. Prevalence of Paramnesia: *Margaret B. Simmons*.—SENSORY STIMULATION BY ATTENTION. By *J. G. Hibben*.—SHORTER CONTRIBUTIONS: Practical Computation of the Median: *E. W. Scripture*. The Second Year at the Yale Laboratory: *E. W. Scripture*.—DISCUSSION, ETC.

SOME OBSERVATIONS ON THE ANOMALIES OF SELF-CONSCIOUSNESS (I.) By *Josiah Royce*.—ON DREAMING OF THE DEAD. By *Havelock Ellis*.—EMOTION, DESIRE, AND INTEREST: DESCRIPTIVE. By *S. F. McLennan*.—REACTION

TIME ACCORDING TO RACE. By *R. Meade Bache*.—DISCUSSION.—(New York and London: Macmillan & Co.)

The criticisms of Mr. Strong in the first article for July, "are directed not "against the aspect theory as a theory of displeasure, but against the aspect theorists' analysis of physical pain. I hold that physical pain is not a compound of "an indifferent sensation with a feeling of displeasure, but itself a sensation which "calls forth displeasure."

The experiments of Cordelia C. Nevers with classes at Wellesley contradict the results of Dr. Jastrow gained at Wisconsin, that "women repeat one another's words more than men," and that their thoughts are directed chiefly to "the ornamental, the individual, and the concrete," while men's show a preference for "the constructive, the useful, the general, the abstract."

In the September number, Dr. R. Meade Bache gives an interesting study of reaction-times with reference to race, where the order of quickness is (1) Indian, (2) African, (3) white man. The results, the author thinks, have a possible bearing on the outcome of the Jackson-Corbett boxing-match.

Articles by Princeton professors which have appeared in the *Review* may now be had in the form of brochures, under the title of *Princeton Contributions to Psychology*. The first number contains Prof. J. M. Baldwin's historical and descriptive account of *Psychology, Past and Present*, and Prof. A. T. Ormond's able disquisition on *Freedom and Psychogenesis*. (Princeton, N. J.: University Press. Price, 50 cents.)

THE AMERICAN JOURNAL OF PSYCHOLOGY. Vol. VII. No. 1.

With the September number, *The American Journal of Psychology* enters upon its seventh volume. The preceding volumes (1887-1895) have been edited by President G. Stanley Hall (Clark University). For the future, the editorial responsibility of the *Journal* will be shared by President Hall, Prof. E. C. Sanford (Clark University), and Prof. E. B. Titchener (Cornell University). A co-operative board has been formed, which includes the names of Prof. F. Angell, Prof. H. Beaunis, Prof. J. Delboeuf, Dr. A. Kirschmann, Prof. O. Kuelpe, Dr. A. Waller, F.R.S., and Prof. H. K. Wolfe. The *Journal* will be devoted exclusively to the interests of experimental psychology (psycho-physiology, psycho-physics, physiological psychology, etc.). Each number will contain, as heretofore, original articles, reviews and abstracts of current psychological books and monographs, and notes upon topics of immediate psychological importance. Contributions may be addressed to either of the three editors.

INTERNATIONAL JOURNAL OF ETHICS. Vol. V. No. 4.

FREE-WILL AND RESPONSIBILITY. By *D. G. Ritchie*.—THE EVOLUTION OF RELIGION. By *Bernard Bosanquet*.—LABOR TROUBLES—CAUSES AND PROPOSED REMEDIES. By *J. H. Hyslop*.—AUTOMATISM IN MORALITY. By *John Grier Hibben*.—SOME OF THE USES OF UNEMOTIONAL MUSIC. By *Countess Elizabeth Phelps Resse*.—DISCUSSIONS. Professor Huxley on the Relation of the Ethical to the Cosmic Process: *Dr. Frances Emily White*. Natural Law, Ethics, and Evolution: *Prof. Josiah Royce*.—GEORG VON GIZYCKI AND THE SCIENCE OF ETHICS. By *Friedrich Jodl*.—BOOK REVIEWS.—(Philadelphia: International Journal of Ethics, 1305 Arch Street.)

Mr. Ritchie accepts the definition of freedom "in the sense that the actions for which man can be held responsible are the outcome of his own conscious self,

and not determined by external causes," but wishes to emphasise the higher and more important aspect of freedom as identical with rationality. He says: "Free-will in the sense of incalculable, unmotivated caprice would not be worth having, even if it were an intelligible idea; free-will, in this higher sense, is the will that can only exist by obedience to the dictates of reason. 'Where there is no law there is no freedom,' is a sound maxim in ethics as well as in politics."

The article of Mr. B. Bosanquet is a "free sketch or impression of Edward Caird's great work on the *Evolution of Religion*."

Mr. Hyslop finds the absolute conditions precedent of all improvement of the laborer's lot in three moral requirements: "(1) prudence in marriage and family responsibilities, otherwise the laborer simply multiplies the competition which is his source of complaint, and the number of those who must share his product; (2) economy in the use of his income, so as to place him upon a level of competition with the property-holder; there is no equality, and ought to be no equality, of economic conditions between the thrifty and the thriftless; (3) co-operative organisation against the unjust or supposedly unjust power of capital."

Mr. Hibben examines the evolutionary theory of ethics and finds that "determination by reason differs radically from determination by impulse, in the sphere of sensibility alone"—a distinction which "saves us from automatism in morals."

Readers will find in Professor Jodl's article a clear characterisation of the present and recent status of ethical thought in Germany.

MIND. NEW SERIES, No. 15.

CONTEXT AND MEANING. By *Alfred Sidgwick*.—THE INTEGRATION OF MIND. By *Edmund Montgomery*.—GNOSTICISM AND MODERN PANTHEISM. By *Prof. G. J. Stokes*.—TIME AND THE SUCCESSION OF EVENTS. By *J. L. McIntyre*.—THE *Poetics of Aristotle*. By *R. P. Hardie*.—DISCUSSIONS, ETC.—(London and Edinburgh: Williams & Norgate.)

REVUE PHILOSOPHIQUE. Vol. XX. No. 6, 7, 8, and 9.

J.-M. CHARCOT: ET SON ŒUVRE PSYCHOLOGIQUE. By *Janet (Dr. Pierre)*.—LA PHILOSOPHIE AU LYCÉE ET A L'AGRÉGATION. By *Bernès (Marcel)*.—DU PHÉNOMÈNE PSYCHOLOGIQUE DE L'HYBRIDITÉ LINGUISTIQUE ET DU BILINGUISME. By *R. de la Grasserie*.

SUR LES ÉLÉMENTS DERNIERS DES CHOSES (Fragments inédits). By *H. Taine*.—LA MESURE DES ILLUSIONS VISUELLES CHEZ LES ENFANTS. By *A. Binet*.—LE TRANSFORMISME SOCIAL. By *G. Tarde*.

LES PHÉNOMÈNES ÉLÉMENTAIRES DE LA VIE. By *F. Le Dantec*.—OBSERVATIONS COMPARATIVES SUR LA RECONNAISSANCE, LA DISCRIMINATION ET L'ASSOCIATION. By *Bourdon*.

AUGUST COMTE: ETUDE CRITIQUE ET PSYCHOLOGIQUE (I). By *Dugas*.—LA MÉTAPHYSIQUE AUX CHAMPS ÉLYSÉES. By *G. Milhaud*.—UNE MORALE MATÉRIELLE EST-ELLE IMPOSSIBLE? By *Cresson*.—ANALYSES ET COMPTES RENDUS, ETC.—(Paris: Felix Alcan.)

Psychologists will be grateful for the account and appreciation which M. P. Janet has given of the work and personality of the late Dr. Charcot. In his remarks on linguistic hybridity and bilingualism M. de la Grasserie claims to find significant and rare psychological phenomena. He cites the curious case of sexual bilingual-

ism, which means that in some tribes the male and the female speak different dialects.

The July number contains some unpublished fragments by Taine *On the Ultimate Elements of Things*, which are clear and suggestive and seem to have been intended for a new edition of his work *De L'Intelligence*. M. Binet in his experiments on the visual illusions of children finds that there are two classes—innate and acquired illusions; the former being more striking in children, the latter in adults. M. Tarde's article is a critical but sympathetic discussion of a work of M. de Greef bearing the same title.

The conclusions of M. le Dantec's long essay on *The Elementary Phenomena of Life* (August) are as follows: "All intra-protoplasmic phenomena in unicellular organisms may take place in the absence of the nucleus if the composition of the protoplasm could in some manner be maintained constant. All phenomena observable in the simplest organisms are to be found, although generally less complicated, in inorganic matter, and their mechanical explanation is possible. The phenomenon of assimilation alone remains mysterious, and that is the real vital phenomenon which holds all others under its sway. It is subject to the influence of the nucleus, and the problem is to discover how that influence is exercised. But all the other vital phenomena without exception, including the conservation of the specific form, etc., are dependent on the phenomenon of assimilation." The lengthy study of M. Bourdon in the same number is devoted to ascertaining whether a constant relation exists between recognition, discrimination, and association.

In the September number we have an able discussion of Auguste Comte's philosophy and personality by M. Dugas, who finds that imagination was the dominant faculty of Comte, explaining both his genius and his extravagances. M. Milhaud gives us a spirited and instructive dialogue which he supposes to take place between Protagoras, St. Anselm, Descartes, Plato, Kant, and others in the celestial regions. We have also in this number a note by M. Ch. Adam on the text of Descartes's *Regulæ ad directionem ingenii* which is to appear in the new complete edition of Descartes's works.

ZEITSCHRIFT FÜR PHILOSOPHIE UND PHILOSOPHISCHE KRITIK Vol. CVI. No. 2.

DIE ETHIK DES DEUTSCHEN IDEALISMUS. By *Dr. Eugen Kühnemann*.—REHMES ALLGEMEINE PSYCHOLOGIE. By *G. K. Uphues*.—DER LOGOS BEI HERAKLIT. By *Lic. Anathon Aall*.—IMMANUEL KANT UND ALEXANDER VON HUMBOLDT (II.). By *P. von Lind*.—RECENSIONEN.—(Leipzig: C. E. M. Pfeffer.)

ARCHIV FÜR SYSTEMATISCHE PHILOSOPHIE. Vol. I. No. 3.

GRUNDLINIEN EINER THEORIE DER WILLENSBILDUNG. By *Paul Natorp*.—UEBER WERTHALTUNG UND WERT. By *A. Meinong*.—UEBER DEN PSYCHOLOGISCHEN URSPRUNG DER POESIE UND KUNST. By *M. J. Monrad*.—ZUR KRITIK DES SEELENBEGRIFFS. Einige Bemerkungen beim Studium der Wundt'schen Psychologie. By *Allen Vannérus*.—(Berlin: George Reimer.)

Professor Natorp's article is the second part of an extended discussion of ethics, and though erudite is practical. Prof. A. Meinong's contribution is welcome, as throwing light on several issues raised in his recent work on the *Werttheorie*. The investigations of Mr. Monrad of Christiania, Norway, are intended to supple-

ment the Aristotelian theory of the double origin of poetry and art. Mr. Vannérus of Stockholm, Sweden, has set himself the task of examining Wundt's view of the soul. According to the custom which was begun with the reorganisation of the *Archiv*, the report on the philosophical literature of Italy for the year 1893-1894 by Roberto Ardigò is printed in the Italian language.

SHI-DO-KWAI-HO-KOKU. Nos. 34 and 35. June and August, 1895.

EDITORIAL : The Great Influence of the Buddhist Religion Upon the Japanese Nation.—SCRIPTURAL : Some Good Rules Adapted to Daily Life (from Sigalovada-Sutra). Mortality in Relation to Immortality (from Sragama-Samadhi-Sutra).—SERMON : True Meaning of "Remembering the Holiness of Buddhahood" Unveiled. By *Rev. Shi-Do Vajo*.—CONTRIBUTIONS AND TRANSLATIONS : India : Her Past, Present, and Future. (Extract from a recent lecture by *S. Murayama*.)—Buddhism in Mongolia.—What They Say.—NOTES : Mr. Takakushu's English Translation of Amitayur-Dhyana-Sutra.—Rev. J. Sano's Return from Corea.—Edwin Arnold on the Late War.—Imperial Order to Give Name to a Buddhist Chief Monk.—Good Work of the Maha-Bodhi Society, India.—Rev. Nicholai's Determination Concerning the Russian Policy Toward Japan.—Professor Inone's Opinions on Buddhism Criticised.—Preaching Buddhism in a Christian Form, or Rhys-Davids's Lectures on Buddhism in Several American Colleges and Universities.—News Concerning the Buddhist Work Among Chinese and Japanese Soldiers in Manchuria, etc., etc.

EDITORIAL : True Heroism.—SERMONS : The Path That Leads to Immortality.—The Great Peace-Maker.—On the Purity of Thought, Word, and Deed.—The Upright Nature of Buddha and the Perverted Nature of Man. (These Sermons were delivered by the Editor before the Chinese prisoners in Tokio.)—LECTURES : Lectures on "Sandôkai," a Famous Work on the Teachings of the Zen or Contemplating Sect. By *S. Ouchi*, before the Young Men's Buddhist Association.—GENERAL ARTICLES : Buddhism in America (from the *New York Sun*).—Three Eminent Christians. By *Philangi Dasa*.—Religions in Inkao, China. By *G. Hayashi*.—CONTRIBUTION : On the Buddhist Terminology. By *M. Ohara*.—NOTES : The Royal Gifts of the Siamese Buddhist Tripitaka.—Buddhist Mission in Formosa.—The *Teku-nio-i*, a work on travels in China during the late war, by a Buddhist monk.—Prof. Enriô Inonye on the Wadamore's new memory-system.—Mr. John G. Short-hall of Chicago Highly Appreciates the Beautiful Manners of Japanese Life and Attributes Them to the Good Influence of Buddhism.—Professor Kitasato on the Prevention of Cholera.—Marshal Yamagata's Study of Buddhism.—New Edition of Complete Buddhist Scriptures in Chinese, by the Obakukiohô-sha, Uji.—The Summer Lectures of the Tokio Young Men's Buddhist Association.—A Letter from the Buddhist Priest Working in Hawaii.—The Professors at the Gakushu-in (High School, Tokio) Most Diligently Study the Psychology of Buddhism.—PUBLISHER'S DEPARTMENT.—(Tokio, Japan : Iwazô Sakai. Edited by Kakichi Ohara.)

THE MONIST.

ON THE PART PLAYED BY ACCIDENT IN INVENTION AND DISCOVERY.¹

IT is characteristic of the naïve and sanguine beginnings of thought in youthful men and nations, that all problems are held to be soluble and fundamentally intelligible on the first appearance of success. The sage of Miletus, on seeing the plant take its rise from moisture, believed he had comprehended the whole of nature, and he of Samos, on discovering that definite numbers corresponded to the lengths of harmonical strings, imagined he could exhaust the nature of the world by means of numbers. Philosophy and science in such periods are blended. Wider experience, however, speedily discloses the error of this course, gives rise to criticism, and leads to the division and ramification of the sciences.

At the same time, the necessity of a broad and general view of the world remains; and to meet this need philosophy parts company with special inquiry. It is true, the two are often found united in gigantic personalities. But as a rule their ways diverge more and more widely from each other. And if the estrangement of philosophy from science can reach a point where data unworthy of the nursery are deemed none too scanty as foundations of the world, on the other hand the thorough-paced specialist may go to the extreme

¹ Inaugural lecture delivered on assuming the Professorship of the History and Theory of Inductive Science in the University of Vienna, October 20, 1895. (Unpublished.) Translated by Thomas J. McCormack.

of rejecting point-blank the possibility of a broader view, or at least of deeming it superfluous, forgetful of Voltaire's apophthegm, nowhere more applicable than here, *Le superflu—chose très nécessaire*.

It is true, the history of philosophy, owing to the insufficiency of its constructive data, is and must be largely a history of error. But it would be the height of ingratitude on our part to forget that the seeds of thoughts which still fructify the soil of special research, such as the theory of irrationals, the conceptions of conservation, the doctrine of evolution, the idea of the specific energies, and so forth, may be traced back in distant ages to philosophical sources. Furthermore, to have deferred or abandoned the attempt at a broad philosophical view of the world from a full knowledge of the insufficiency of our materials, is quite a different thing from never having undertaken it at all. The revenge of its neglect, moreover, is constantly visited upon the specialist by his committal of the very errors which philosophy long ago disclosed. As a fact, in physics and physiology, particularly during the first half of this century, are to be met intellectual productions which for naïve simplicity yield not an iota to those of the Ionian school, or to the Platonic ideas, or to that much reviled ontological proof.

Latterly, there has been evidence of a gradual change in this state of affairs. Recent philosophy has set itself more modest and more attainable ends; she is no longer inimical to special inquiry; in fact, she is zealously taking a part in that inquiry. On the other hand, the special sciences, mathematics and physics, no less than philology, have become eminently philosophical. The material presented is no longer accepted uncritically. The glance of the inquirer is bent to the neighboring fields, whence that material has been derived. The different special departments are striving for closer union, and gradually the conviction is gaining ground that philosophy can consist only of mutual, complementary criticism, interpenetration, and union of the special sciences into a consolidated whole. As the blood in nourishing the body separates into countless capillaries, only to be collected again and to meet in the heart, so in the science of the future all the rills of knowledge will be gathered more and more into a common and undivided stream.

It is this view—not an unfamiliar one to the present generation—that I purpose to advocate. Cherish no hope, or rather have no fear, that I shall erect systems for you. I shall remain a natural inquirer. Nor expect that it is my intention to skirt all the fields of natural inquiry. I can attempt to be your guide only in that branch which is familiar to me, and even there I can assist in the furtherment of only a small portion of the allotted task. If I shall succeed in rendering plain to you the relations of physics, psychology, and the theory of knowledge, so that you may draw from each of them profit and light, redounding to each, I shall regard my work as not having been in vain. Therefore, to illustrate by an example how, consonantly with my powers and views, I conceive such inquiries should be conducted, I shall treat to-day, in the form of a brief sketch, of the following special and limited subject—of *the part which accidental circumstances play in the development of inventions and discoveries.*

* * *

When we Germans say of a man that he was not the inventor of gunpowder,¹ we impliedly cast a grave suspicion on his abilities. But the expression is not a felicitous one, as there is probably no invention in which deliberate thought had a smaller, and pure luck a larger, share than in this. It is well to ask, Are we justified in placing a low estimate on the achievement of an inventor because accident has assisted him in his work? Huygens, whose discoveries and inventions are justly sufficient to entitle him to an opinion in such matters, lays great emphasis on this factor. He asserts that a man capable of inventing the telescope without the concurrence of accident must have been gifted with superhuman genius.²

A man living in the midst of civilisation finds himself surrounded by a host of marvellous inventions, considering none other than the means of satisfying the needs of every-day life. Picture such

¹ The phrase is, *Er hat das Pulver nicht erfunden.*

² "Quod si quis tanta industria exstitisset, ut ex naturae principiis et geometria hanc rem eruere potuisset, eum ego supra mortalium sortem ingenio valuisse dicendum crederem. Sed hoc tantum abest, ut fortuito reperti artificii rationem non adhuc satis explicari potuerint viri doctissimi."—Hugenii Dioptrica (de telescopiis).

a man transported to the epoch preceding the invention of these ingenious appliances, and imagine him undertaking in a serious manner to comprehend their origin. At first the intellectual power of the men capable of producing such marvels will strike him as incredible, or, if we adopt the ancient view, as divine. But his astonishment is considerably allayed by the disenchanting yet elucidative revelations of the history of primitive culture, which to a large extent prove that these inventions took their rise very slowly and by imperceptible degrees.

A small hole in the ground with fire kindled in it constituted the primitive stove. The flesh of the quarry, wrapped with water in its skin, was boiled by contact with heated stones. Cooking by stones was also performed in wooden vessels. Hollow gourds were protected from the fire by coats of clay. Thus, from the burned clay accidentally originated the enveloping pot, which rendered the gourd superfluous, although for a long time thereafter the clay was still spread over the gourd, or pressed into woven wicker-work, before the potter's art assumed its final independence. Even then the wicker-work ornament was retained, as a sort of attest of its origin.

We see, thus, it is by accidental circumstances, that is, by such as lie without his purpose, foresight, and power, that man is gradually led to the acquaintance of improved means of satisfying his wants. Let the reader picture to himself the genius of a man who could have foreseen without the help of accident that clay handled in the ordinary manner would produce a useful cooking utensil ! The majority of the inventions made in the early stages of civilisation, including language, writing, money, and the rest, could not have been the product of deliberate methodical reflexion for the simple reason that no idea of their value and significance could have been had except from their practical use. The invention of the bridge may have been suggested by the trunk of a tree which had fallen athwart a mountain-torrent ; that of the tool by the use of a stone accidentally taken into the hand to crack nuts. The use of fire probably started in and was disseminated from regions where volcanic eruptions, hot springs, and burning jets of natural gas

afforded opportunity for quietly observing and turning to practical account the properties of fire. Only after that had been done could the significance of the fire-drill be appreciated, an instrument which was probably discovered by boring a hole through a piece of wood. The suggestion of a distinguished inquirer that the invention of the fire-drill originated on the occasion of a religious ceremony is both fantastic and incredible. And as to the use of fire, we should no more attempt to derive that from the invention of the fire-drill than we should from the invention of sulphur matches. Unquestionably the opposite course was the real one.¹

Similar phenomena, though still largely veiled in obscurity, mark the initial transition of nations from a hunting to a nomadic life and to agriculture.² We shall not multiply examples, but content ourselves with the remark that the same phenomena recur in historical times, in the ages of great technical inventions, and, further, that regarding them the most whimsical notions have been circulated—notions which ascribe to accident an unduly exaggerated part, and one which in a psychological respect is absolutely impossible. The observation of steam escaping from a tea-kettle and of the clattering of the lid is supposed to have led to the invention of the steam-engine. Just think of the gap between this spectacle and the conception of the performance of a large amount of work by steam, for a man totally ignorant of the steam-engine! Let us suppose, however, that an engineer, versed in the practical construction of pumps, should accidentally dip into water an inverted bottle that had been filled with steam for drying and still retained its steam. He would see the water rush violently into the bottle, and the idea would very naturally suggest itself of founding on this experience a convenient and useful atmospheric steam-pump, which by imperceptible degrees, both psychologically possible and immediate, would then undergo a natural and gradual transformation into Watt's steam-engine.

¹ I must not be understood as saying that the fire-drill has played no part in the worship of fire or of the sun.

² Compare on this point the extremely interesting remarks of Dr. Paul Carus in his *Philosophy of the Tool*, Chicago, 1893.

But granting that the most important inventions are brought to man's notice accidentally and in ways that are beyond his foresight, yet it does not follow that accident alone is sufficient to produce an invention. The part which man plays is by no means a passive one. Even the first potter in the primeval forest must have felt some stirrings of a genius within him. In all such cases, the inventor is obliged *to take note* of the new fact, he must discover and grasp its advantageous feature, and must have the power to turn that feature to account in the realisation of his purpose. He must *distinguish* the new feature, impress it upon his memory, unite and interweave it with the rest of his thought; in short, he must possess the capacity *to profit by experience*.

The capacity to profit by experience might well be set up as a test of intelligence. That power varies considerably in men of the same race, and increases enormously as we advance from the lower animals to man. The former are limited almost entirely to the reflex actions which they have inherited with their organism, they are almost totally incapable of individual experience, and considering their simple wants are scarcely in need of it. The ivory-snail (*Eburna spirata*) never learns to avoid the carnivorous *Actinia*, no matter how often it may wince under the latter's shower of needles, having apparently no memory whatever for pain.¹ A spider can be lured forth repeatedly from its hole by touching its web with a tuning-fork. The moth plunges again and again into the flame which has burnt it. The humming-bird hawk-moth² dashes repeatedly against the painted roses of the wall-paper, like the unhappy and desperate thinker who never wearies of attacking in the same way the same insoluble chimerical problem. As aimlessly almost as Maxwell's gaseous molecules and in the same unreasoning manner common flies in their search for light and air stream against the glass pane of a half-opened window and remain there from sheer inability to find their way around the narrow frame. But

¹ Möbius, *Naturwissenschaftlicher Verein für Schleswig-Holstein*, Kiel, 1893, p. 113 et seq.

² I am indebted for this observation to Professor Hatscheck.

a pike separated from the minnows of his aquarium by a glass partition, learns after the lapse of a few months, though only after having butted himself half to death, that he cannot attack these fishes with impunity. What is more, he leaves them in peace even after the removal of the partition, though he will bolt at once a strange fish. Considerable memory must be attributed to birds of passage, a memory which, probably owing to the absence of disturbing thoughts, acts with the precision of that of some idiots. Finally, the susceptibility to training evinced by the higher vertebrates is indisputable proof of the ability of these animals to profit by experience.

A powerfully developed *mechanical* memory, which recalls vividly and faithfully old situations, is sufficient for avoiding definite particular dangers, or for taking advantage of definite particular opportunities. But more is required for the development of *inventions*. More extensive chains of images are necessary here, the excitation by mutual contact of widely different trains of ideas, a more powerful, more manifold, and richer connexion of the contents of memory, a more powerful and impressionable psychical life, heightened by use. A man stands on the bank of a mountain-torrent, which is a serious obstacle to him. He remembers that he has crossed just such a torrent before on the trunk of a fallen tree. Hard by trees are growing. He has often moved the trunks of fallen trees. He has also felled trees before, and then moved them. To fell trees he has used sharp stones. He goes in search of such a stone, and as the old situations that crowd into his memory and are held there in living reality by the definite powerful interest which he has in crossing just this torrent,—as these impressions are made to pass before his mind in the *inverse order* in which they were here evoked, he invents the bridge.

There can be no doubt but the higher vertebrates adapt their actions in some moderate degree to circumstances. The fact that they give no appreciable evidence of advance by the accumulation of inventions, is satisfactorily explained by a difference of degree or intensity of intelligence as compared with man; the assumption of a difference of kind is not necessary. A person who saves a little

every day, be it ever so little, has an incalculable advantage over him who daily loses that amount, or is unable to keep what he has accumulated. A slight quantitative difference in such things explains enormous differences of advancement.

The rules which hold good in prehistoric times also hold good in historical times, and the remarks made on invention may be applied almost without modification to discovery; for the two are distinguished solely by the use to which the new knowledge is put. In both cases the investigator is concerned with some *newly observed* relation of new or old properties, abstract or concrete. It is observed, for example, that a substance which gives a chemical reaction *A* is also the cause of a chemical reaction *B*. If this observation fulfils no purpose but that of furthering the scientist's insight, or of removing a source of intellectual discomfort, we have a discovery; but an invention, if in using the substance giving the reaction *A* to produce the desired reaction *B*, we have a practical end in view, and seek to remove a cause of material discomfort. The phrase, *disclosure of the connexion of reactions*, is broad enough to cover discoveries and inventions in all departments. It embraces the Pythagorean proposition, which is a combination of a geometrical and an arithmetical reaction, Newton's discovery of the connexion of Kepler's motions with the law of the inverse squares, as perfectly as it does the detection of a small appropriate alteration in the construction of a tool, or of an appropriate change in the methods of work of a dyeing establishment.

The disclosure of new provinces of facts before unknown can only be brought about by accidental circumstances, under which are *remarked* facts that commonly go unnoticed. The achievement of the discoverer here consists in his *sharpened attention*, which detects the uncommon features of an occurrence and their determining conditions from their most evanescent marks,¹ and discovers means of submitting them to exact and full observation. Under this head belong the first disclosures of electrical and magnetic phenomena, Grimaldi's observation of interference, Arago's discovery of the in-

¹ Cf. Hoppe, *Entdecken und Finden*. 1870.

creased check suffered by a magnetic needle vibrating in a copper envelope as compared with that observed in a bandbox, Foucault's observation of the stability of the plane of vibration of a rod accidentally struck while rotating in a turning-lathe, Mayer's observation of the increased redness of venous blood in the tropics, Kirchhoff's observation of the augmentation of the *D*-line in the solar spectrum by the interposition of a sodium lamp, Schönbein's discovery of ozone from the phosphoric smell emitted on the disruption of air by electric sparks, and a host of others. All these facts, of which unquestionably many were *seen* numbers of times before they were *noticed*, are examples of the inauguration of momentous discoveries by accidental circumstances, and place the importance of strained attention in a brilliant light.

But not only is a significant part played in the beginning of an inquiry by co-operative circumstances beyond the foresight of the investigator; their influence is also active in its prosecution. Dufay, thus, whilst following up the behavior of *one* electrical state which he had assumed, discovers the existence of *two*. Fresnel learns by accident that the interference-bands received on ground glass are seen to better advantage in the open air. The diffraction-phenomenon of two slits proved to be considerably different from what Fraunhofer had anticipated, and in following up this circumstance he was led to the important discovery of grating-spectra. Faraday's induction-phenomenon departed widely from the initial conception which occasioned his experiments, and it is precisely this deviation that constitutes his real discovery.

Every man has pondered on some subject. Every one of us can multiply the examples cited, by less illustrious ones from his own experience. I shall cite but one. On rounding a railway curve once, I accidentally remarked a striking apparent inclination of the houses and trees. I discovered from this that the direction of the total physical acceleration of a mass carries with it as its physiological reaction the perception of the vertical. Afterwards, in attempting to inquire more carefully into this phenomenon, and this only, in a large whirling machine, the collateral phenomena conducted me to the sensation of the angular acceleration, vertigo,

Flouren's experiments on the section of the circular canals, and so on, from which gradually resulted views relating to the sensations of direction which are also held by Breuer and Brown, which were at first contested on all hands, but are now regarded on many sides as correct, and which have been recently enriched by the interesting inquiries of Breuer concerning the *macula acustica*, and Kreidel's experiments with magnetically orientable crustacea. Not disregard of accident but a direct and purposeful employment of it advances research.

The more powerful the psychical connexion of the memory pictures is,—and it varies according to the individual and the mood,—the more apt is the same accidental observation to be productive of results. Galileo knows that the air has weight; he also knows of the "resistance to a vacuum," expressed both in weight and in the height of a column of water. But the two ideas dwelt asunder in his mind. It remained for Torricelli to vary the specific gravity of the liquid measuring the pressure, and not till then was the air included in the list of pressure-exerting fluids. The reversal of the lines of the spectrum was seen repeatedly before Kirchhoff, and had been mechanically explained. But it was left for his penetrating vision to discern the evidence of the connexion of this phenomenon with questions of heat, and to him alone through persistent labor was revealed the sweeping significance of the fact for the mobile equilibrium of heat. Supposing, then, that such a rich organic connexion of the elements of memory exists, and is the prime distinguishing mark of the inquirer, next in importance certainly is that *intense interest* in a definite object, in a definite idea, which fashions advantageous combinations of thought from elements before disconnected, and obtrudes that idea into every observation made, and into every thought formed, making it enter into relationship with all things. Thus Bradley, deeply engrossed with the subject of aberration, is led to its solution by an exceedingly unobtrusive experience in crossing the Thames. It is permissible, therefore, to ask whether accident leads the discoverer, or the discoverer accident, to a successful outcome in scientific quests.

No man should dream of solving a great problem unless he is

so thoroughly saturated with his subject that everything else sinks into comparative insignificance. During a hurried meeting with Mayer in Heidelberg once, Jolly remarked, with a rather dubious implication, that if Mayer's theory were correct water could be warmed by shaking. Mayer went away without a word of reply. Several weeks later, and now unrecognised by Jolly, he rushed into the latter's presence exclaiming: "Es ischt aso!" (It is so, it is so!). It was only after considerable explanation that Jolly found out what Mayer wanted to say. The incident needs no comment.¹

A person deadened to sensory impressions and given up solely to the pursuit of his thoughts, also can light on an idea that will divert his mental activity into totally new channels. In such cases it is a psychical accident, an intellectual experience, as distinguished from a physical accident, to which the person owes his discovery—a discovery which is here made "deductively" by means of mental copies of the world, instead of experimentally. *Purely* experimental inquiry, moreover, does not exist, for, as Gauss says, virtually we always experiment with our thoughts. And it is precisely that constant, corrective interchange or intimate union of experiment and deduction, as it was cultivated by Galileo in his *Dialogues* and by Newton in his *Optics*, that is the foundation of the benign fruitfulness of modern scientific inquiry as contrasted with that of antiquity, where observation and reflexion oftentimes pursued their several courses like two strangers.

We have to wait for the appearance of a favorable physical accident. The movement of our thoughts obeys the law of association. In the case of meagre experience the result of this law is simply the mechanical reproduction of definite sensory experiences. On the other hand, if the psychical life is subjected to the incessant influences of a powerful and rich experience, then every representative element in the mind is connected with so many others that the actual and natural course of the thoughts is easily influenced and determined by insignificant circumstances, which accidentally are decisive. Hereupon, the process termed imagination produces

¹ This story was related to me by Jolly, and subsequently repeated in a letter from him.

its protean and infinitely diversified forms. Now what can we do to guide this process, seeing that the combinatory law of the images is without our reach? Rather let us ask, what influence can a powerful and constantly recurring idea exert on the movement of our thoughts? According to what has preceded, the answer is involved in the question itself. The *idea* dominates the thought of the inquirer, not the latter the former.

Let us see, now, if we can acquire a profounder insight into the process of discovery. The condition of the discoverer is, as James has aptly remarked, not unlike the situation of a person who is trying to remember something that he has forgotten. Both are sensible of a gap, and have only a remote presentiment of what is missing. Suppose I meet in company a well-known and affable gentleman whose name I have forgotten, and who to my horror asks to be introduced to someone. I set to work according to Lichtenberg's rule, and run down the alphabet in search of the initial letter of his name. A vague sympathy holds me at the letter *G*. Tentatively I add the second letter and am arrested at *c*, and long before I have tried the third letter *r*, the name "Gerson" breaks sonorously upon my ear, and my anguish is gone. While taking a walk I meet a gentleman from whom I receive a communication. On returning home, and in attending to weightier affairs, the matter slips my mind. Moodily, but in vain, I ransack my memory. Finally I observe that I am going over my walk in thought. On the street corner in question the gentleman again stands before me and repeats his communication. In this process are recalled successively to consciousness all the percepts which were connected with the percept that was lost, and with them, finally, that, too, is brought to light. In the first case—where the experience had already been made and is permanently impressed on our thought—a *systematic* procedure is both possible and easy, for we know that a name must be composed of a limited number of sounds. But at the same time it should be observed that the labor involved in such a combinatorial task would be enormous if the name were long and the responsiveness of the mind weaker.

It is often said, and not wholly without justification, that the

scientist has solved a *riddle*. Every problem in geometry may be clothed in the garb of a riddle. Thus: "What thing is that M which has the properties A, B, C ?" "What circle is that which touches the straight lines A, B , touching B in the point C ?" The first two conditions marshal before the imagination the group of circles whose centres lie in the line of symmetry of A, B . The third condition reminds us of all the circles having centres in the straight line which stands at right angles to B in C . The *common* term, or common terms, of these groups of images solve the riddle—satisfy the problem. Puzzles dealing with things or words induce similar processes, but the memory in such cases is exerted in many directions and more varied and less clearly ordered provinces of ideas have to be surveyed. The difference between the situation of a geometer who has a construction to make, and that of an engineer, or a scientist, confronted with a problem, is simply this, that the first moves in a field with which he is thoroughly acquainted, whereas the two latter are obliged to familiarise themselves with this field subsequently, and in a measure far transcending what is commonly required. In this process the mechanical engineer has at least always a definite goal before him and definite means to accomplish his aim, whilst in the case of the scientist that aim is in many instances presented only in vague and general outlines. Often the very formulation of the riddle devolves on him. Frequently it is not until the aim has been reached that the broader outlook requisite for systematic procedure is obtained. By far the larger portion of his success, therefore, is contingent on luck and instinct. It is immaterial, so far as its character is concerned, whether the process in question is brought rapidly to a conclusion in the brain of one man, or whether it is spun out for centuries in the minds of a long succession of thinkers. The same relation that a word solving a riddle bears to that riddle is borne by the modern conception of light to the facts discovered by Grimaldi, Römer, Huygens, Newton, Young, Malus, and Fresnel, and only by the help of this slowly developed conception is our mental vision enabled to embrace the broad domain of facts in question.

A welcome complement to the discoveries which the history of

civilisation and comparative psychology have furnished, is to be found in the confessions of great scientists and artists. Scientists *and* artists, we might say, for Liebig courageously declared there was no essential difference between the labors of the two. Are we to regard Leonardo da Vinci as a scientist or as an artist? If it is the business of the artist to build up his work from a few motives, it is the task of the scientist to discover the motives which permeate reality. If scientists like Lagrange or Fourier are in a certain measure artists in the presentation of their results, on the other hand, artists like Shakespeare or Ruysdael are scientists in the insight which must have preceded their creations.

Newton, when questioned about his methods of work, could give no other answer but that he was wont to ponder again and again on a subject; and similar utterances are accredited to D'Alembert and Helmholtz. Scientists and artists both recommend persistent labor. After the repeated survey of a field has afforded opportunity for the interposition of advantageous accidents, has rendered all the traits that suit with the mood or the dominant thought more vivid, and has gradually relegated to the background all things that are inappropriate, making their future appearance impossible; then from the teeming, swelling host of fancies which a free and high-flown imagination calls forth, suddenly that particular form arises to the light which harmonises perfectly with the ruling idea, mood, or design. Then it is that that which has resulted slowly as the result of a gradual selection, appears as if it were the outcome of a deliberate act of creation. Thus are to be explained the statements of Newton, Mozart, Richard Wagner, and others, when they say that thoughts, melodies, and harmonies had poured in upon them, and that they had simply retained the right ones. Undoubtedly, the man of genius, too, consciously or instinctively, pursues systematic methods, wherever it is possible; but in his delicate presentiment he will omit many a task or abandon it after a hasty trial on which a less endowed man would squander in vain his energies. Thus, the genius accomplishes¹ in a brief space of

¹I do not know whether Swift's academy of schemers in Lagado, in which great discoveries and inventions were made by a sort of verbal game of dice, was in-

time undertakings for which the life of an ordinary man would far from suffice. We shall hardly go astray if we regard genius as only a slight deviation from the average mental endowment—as possessing simply a greater sensitiveness of cerebral reaction and a greater swiftness of reaction. The men who, obeying their inner impulses, make sacrifices for an idea instead of advancing their material welfare, may appear to the full-blooded Philistine as fools; yet we shall scarcely adopt Lombroso's view, that genius is to be regarded as a disease, although it is unfortunately true that a more sensitive brain, a more fragile constitution, succumbs far more readily to sickness.

The remark of C. G. J. Jacobi that mathematics is slow of growth and only reaches the truth by long and devious paths, that the way to its discovery must be prepared for long beforehand, and that then the truth will make its long-deferred appearance as if impelled by some divine necessity¹—all this holds true of every science. We are astounded often to note that it required the combined labors of many eminent thinkers for a full century to reach a truth which it takes us only a few hours to master and which once acquired seems extremely easy to reach under the right sort of circumstances. To our humiliation we learn that even the greatest men are born more for life than for science. The extent to which even they are indebted to accident—to that singular conflux of the physical and the psychical life in which the continuous but yet imperfect and never-ending adaptation of the latter to the former finds its distinct expression—that has been the subject of our remarks to-day. Jacobi's poetical thought of a divine necessity acting in science will lose none of its loftiness for us if we discover in this necessity the same power that destroys the unfit and fosters the fit. For loftier, nobler, and more romantic than poetry is the truth and the reality.

VIENNA.

E. MACH.

tended as a satire on Francis Bacon's method of making discoveries by means of huge synoptic tables constructed by scribes. It certainly would not have been ill-placed.

¹ The original passage in Latin is quoted by Simony, *In ein ringförmiges Band einen Knoten zu machen*, Vienna, 1881, p. 41.

PATHOLOGICAL PLEASURES AND PAINS.¹

THE title of this article may appear paradoxical, pleasure being ordinarily the expression of a state of health or even of exuberance of life, whilst pain is by definition a diseased state. It must be acknowledged that the expression "abnormal" would be preferable. Nevertheless, the facts which form the subject of our study are not uncommon and deserve separate consideration, for the anomalies and deviations of pleasure and pain serve to give us a better insight into their nature.

The application of the pathological method to psychology is in need of no justification ; its title is already established. The results obtained are too numerous and too well known to require enumeration. The principal advantages of the method are two : (1) It is an instrument of amplification, and magnifies the normal phenomenon. (Hallucination enables us to understand better the rôle of the image, and hypnotic suggestion throws a flood of light on the suggestion of common life.) (2) It is an invaluable instrument of analysis. Pathology, it has been justly said, is simply physiology deranged ; for nothing enables us to understand a mechanism better than the suppression or the displacement of one of its wheels. Aphasia produces a decomposition of memory, and discloses properties, which the subtlest psychological analysis could never have compassed, nor even have foreshadowed.

The principal difficulty in this method consists in determining the precise moment at which it can be applied. The distinction of health and disease is at times extremely troublesome. Undoubtedly

¹ Translated from Professor Ribot's manuscript by Thomas J. McCormack.

there are cases where hesitation is impossible ; but there are border zones which fluctuate widely between disease and health. Claude Bernard has ventured to write : "The normal state so called is a pure fiction of the mind, an ideal typical form entirely denuded of the thousand and one divergences between which the organism incessantly oscillates amid its alternating and intermittent functions." If this is true of health of body, how much more is it so of health of mind. The dilemma, That man is insane or not insane, says Griesinger, is absolutely devoid of meaning in many cases. The psychical organism, being more complex and more unstable than the physical organism, admits far less easily of the establishment of a norm. Finally that difficulty attains its maximum in our subject, because the emotional life which is the most mobile of all the forms of the psychical life oscillates incessantly about a point of equilibrium and is constantly apt to fall too low or to rise too high.

But as it is imperative to decide upon the adoption of some characters as pathological marks, or criteria, in distinguishing the healthy from the unhealthy in the affective sphere, we shall adopt those enunciated by Féré. According to him an emotion may be considered morbid :

(1) When its physiological concomitants appear with extraordinary intensity. [It would seem proper to add "or with extraordinary depression."]

(2) When it is produced without a sufficient determining cause.

(3) When its effects are unduly prolonged.¹

These three criteria, which I shall call, abnormal reaction by excess or deficit, (apparent) disproportion between cause and effect, chronicity, may often be used to advantage in the study of the morbid emotions. For the present we are concerned only with pleasure and pain.

I.

Let us begin with pleasure. I shall examine first a typical case studied by many psychologists, but of which none in my opinion

¹ Féré, *Pathologie des émotions*, p. 223.

has given a satisfactory explanation. I refer to the particular state that has been called *the luxury of grief* (Spencer), *pleasure in pain* (Bouillier), but which might more precisely be called *the pleasure of pain*. It consists in the willing embrace of suffering and in the enjoyment of it as genuine pleasure.

This disposition of the soul is not, as might be supposed, exclusively characteristic of *blasé* people and of artificial civilisations; it seems to be inherent in humanity on its first emergence from barbarism. Bouillier¹ has pointed out among the authors of antiquity passages which mention it, not only in Lucretius, Seneca, and other moralists, but in the poems of Homer, themselves a reflex of an extremely primitive civilisation and of one furthermore in which "people rejoiced in their tears." They are to be found, I suppose, in the Bible and in the epics of ancient India. We are dealing, therefore, with no unusual phenomenon; although the further we advance in civilisation the more frequent is its appearance.

But facts will avail more than quotations. They are various in kind: pleasure of physical pain, pleasure of moral pain. Some patients experience an intense voluptuousness in irritating their wounds. "I have known," says Mantegazza, "an old man who confided to me that he found extraordinary pleasure, inferior to no other he had ever experienced, in scratching the inflamed edges of an old sore on his leg, from which he had suffered for several years."² A celebrated scholar of the Renaissance, Jerome Cardan, tells us in his autobiography, "that he could never go without suffering, and that when such befel him, he was conscious of a gathering impetuosity which welcomed additional pain, of any sort and however great, as a positive relief." Thus, he was wont in this condition to torture his body till the tears came.³ We might continue with a long enumeration of the pleasures of physical pain. Of the pleasure of mental pain I shall give but one instance: melan-

¹ Bouillier, *Du plaisir et de la douleur*, Chap. VII.

² Mantegazza, *Fisiologia del piacere*, p. 26.

³A curious study in pathological psychology awaits the psychologist in the *De Vita Propria* of Cardan, who was manifestly what in our days is called a neuro-path, a non-equilibrate.

choly in the ordinary, not in the medical, signification of the word, viz., that of lovers, of poets, of artists, etc.,—a state which may be regarded as the type of the complaisant degustation of sadness. There is none of us but can be sad, if we wish, but not melancholical. I shall further mention in passing the pleasures of the ugly in æsthetics, and the taste for bloody spectacles and tortures.

Let us leave the facts, now, for the attempts at explanation which have been proposed. They are not numerous. Bouillier (*loc. cit.*) appears to adopt the opinion of a Cartesian, who says: "If the soul in all its movements of passion, even in its most painful, is in some sort gratified by the secret pain it suffers; if it willingly embraces this pain; if it repulses all proffers of consolation; it is because it is conscious that the state in which it exists is the state of heart and mind which best accords with the situation." I do not understand this pretended explanation. I prefer that of Hamilton, who finds the principal cause "in the superaddition of activity which the feeling of our sufferings imparts to our whole being." This, at least, is logical, inasmuch as the pleasure is referred to its ordinary correlative—increase of activity. Spencer has treated the problem at some length. He says:¹

"Here I will draw attention only to one other egoistic sentiment; and I do this chiefly because of its mysterious nature. It is a pleasurable-painful sentiment, of which it is difficult to identify the nature, and still more difficult to trace the genesis. I refer to what is sometimes called "the luxury of grief." . . . It seems possible that this sentiment, which makes a sufferer wish to be alone with his grief, and makes him resist all distraction from it, may arise from dwelling on the contrast between his own worth as he estimates it and the treatment he has received—either from fellow-beings or from a power which he is prone to think of anthropomorphically. If he feels that he has deserved much while he has received little, and still more if instead of good there has come evil, the consciousness of this evil is qualified by the consciousness of worth, made pleasurable dominant by the contrast . . . , there is an idea of much withheld, and a feeling of implied superiority to those who withhold it. . . . That this explanation is the true one, I feel by no means clear. I throw it out simply as a suggestion: confessing that this peculiar emotion is one which neither analysis nor synthesis enables me clearly to understand."

¹ *Principles of Psychology*, Vol. II., § 518.

The foregoing explanation seems to me to be only a partial one and inapplicable to all cases. In my opinion, all attempts of this sort are doomed to failure because their authors proceed on the assumptions of normal psychology. The phenomena in question should be treated by the pathological method. It will be objected, possibly, that this is but substituting one word for another. But that this is not the case, will be seen from the following.

Psychologists have made the mistake of attacking the phenomena from the beginning in too delicate a form, and of considering them separately. They should have proceeded, not by the way of synthesis, nor by that of analysis, but by the method of amplification. What is necessary is to establish a series, in which the last terms, enormously magnified, shed light on the first. Let me indicate the principal stages of the gradation: æsthetic, transitory, and intermittent melancholia; spleen; melancholia in the medical sense of the term. "One abnormal mode of feeling in melancholic patients," remarks Krafft-Ebing, "is the happiness of pain (*Leidseligkeit*). Ideas, which in the healthy state would provoke pain, excite in the afflicted consciousness of these patients a weak sentiment of satisfaction which expresses their corresponding affective tone." Going further, we meet with a tendency to suicide, and finally with suicide itself. The last term furnishes a key to the understanding of all the others. The first are simply *embryonic forms, abortive or mitigated, of the creature's tendency towards its own destruction, or of the desire which regards that end as an agreeable consummation*. Checked in the immense majority of cases, the feeble forms are yet an initial step towards the destruction, and can only be explained by approach from the extreme case.

Evolutionists have advanced the hypothesis of animals so constituted that pleasure in their case was coupled with destructive acts, and pain with beneficial acts; and that as every animal seeks pleasure and avoids pain, such animals are bound to perish from their very nature. The supposition is not chimerical, for we constantly see men delighting in acts which they know perfectly well will speedily lead to their taking-off. A being thus constituted is

abnormal, illogical, and bears within him a self-contradiction which can only result in his annihilation.

But, it may be said, if pain and harmful actions on one side and pleasure and beneficial actions on the other, form indissoluble couples, so that a painful state in consciousness is the equivalent of destructive acts in the organism, and *vice versa*, we should have, in the case supposed, necessarily an inversion—pleasure would express disorganisation, pain reorganisation. The hypothesis in question, which is improbable on its face, does not appear necessary. If we admit that pleasure and pain always exist by virtue of simultaneous and contrary processes, of which the sole difference exists in consciousness, it is sufficient if one of the two processes augments or the other diminishes abnormally, for the difference also to alter in favor of the one or the other. Unquestionably, the ultimate result is a contradiction of the rule, because in the cases considered the surplus which should be negative (pain) is positive (pleasure); and this a fresh proof that we are confronted with a deviation, with an anomaly, with a pathological case, which should be treated accordingly.

We have selected and studied a typical case; it remains for us, not to enumerate, but to classify pathological pleasures, in order to show their frequency.

Taking as our guide the excellent definition of Mantegazza, "morbid pleasure is one which is the cause or the effect of a disease," I distribute them into the following three classes:

1. *Semi-pathological pleasures.* These form a transition from the healthy to the morbid-sound. They are such as require an excessive or prolonged expenditure of vital energy. It is known that pleasures of taste, of smell, of sight, of hearing, of touch, of muscular exercise, of sexual intercourse, produce fatigue and exhaustion, or even suddenly become painful. The pleasures of dotage, of self-love, of possession, when transformed into passions, that is, when increased in intensity and stability, cease to be pure pleasures: a painful element is mingled with them. This phenomenon is natural and logical, since all augmentation of activity carries with it losses and consequently the conditions of pain. The present

class is scarcely morbid, because the pain succeeds the pleasure. This is not the case with the next two, where the pleasure springs directly from the destruction and is alone dominant in consciousness.

(2) *Pleasures destructive of the individual.* I shall not stop at certain anomalies of the taste and smell. But the pleasures due to intoxication and to narcotic stimulants are so widespread as to appear inherent in humanity. At all times and in all places, even among savage races, man has found artificial means of transporting himself, if only for a moment, to spheres of dreams and enchantment. These are pleasures which he has created for his own destruction. But there are cases more striking still, not acquired and invented, cases in which pleasure conceals and dominates the work of disorganisation. Thus, during a certain period of general paralysis the patient believes himself in the possession of unbounded energy, health, riches, and power, and his satisfaction and happiness are expressed in his whole demeanor. Thus, in certain forms of acute mania, the disease is assimilated, on one side, which we shall here neglect, to anger, while on the other side we are confronted with a broad expansive humor, a joy which overflows, a sentiment of energy and vigor. Some of these patients say on their recovery that they have never felt so happy as during their disease (Krafft-Ebing). We might also cite the case of consumptives. Such patients are never so rich in hopes and fertile in projects as when they are on the brink of death. Finally, there is the "euphoria" of the dying. The attempt has been made to explain this by analgesia, as if the suppression of pain were identical with the appearance of joy. Féré, who has examined this question in his *Pathologie des émotions* (p. 170 et seq.), assumes that this exaltation is due to momentary, but positive, conditions of the cerebral circulation.

Must we admit in such cases that, by an almost inconceivable violation of natural determinism, pleasure becomes the expression in consciousness of a profound, implacable disorganisation? Of this there is no need. It is more rational to assume that pleasure is connected here as elsewhere with its natural cause, a superactivity of the vital process. Every pathological pleasure is accompanied

with excitability, but the latter is not a normal activity, lacking which the fever patient or the neuropath would have excess of health. In point of fact, we are confronted by a complex case: on the one side there is a perpetual and enormous waste which proceeds at a tremendous rate without expression in consciousness; on the other side a momentary and conscious superficial excitation. The anomaly lies in this psychical disproportion, or rather, in the myopia of consciousness, which cannot transcend its narrow limits and penetrate to the region of the unconscious.

(3) *Pleasures destructive of the social character.* These are connected not with the sufferings of the individual but with those of others. Such is the pleasure experienced in killing, in seeing persons killed, in bloody spectacles, in bull fights, combats of animals, and, in a far feebler degree, in listening to or in reading accounts of bloody deeds. These pleasures can be explained. They denote the satisfaction of violent and destructive tendencies which, weak or powerful, unconscious or conscious, exist in all men. Their study carries us into the pathology of tendencies which I shall not treat here. I shall simply remark in passing that these tendencies involve a certain expenditure of energy—which is one of the conditions of active pleasure.

A final question. Can pleasure, but particularly joy, be the cause of a grave catastrophe, such as insanity and death?

Some alienists, Bucknill, Tuke, Guislain, and others, have cited cases of insanity which they attribute to sudden joy: an unexpected legacy, a coveted place or honor. Griesinger maintains "that it is extremely rare for immoderate joy alone to produce insanity, if it ever does so." Others deny its possibility absolutely.¹ It is certain that in the enumeration of the causes of insanity joy does not occupy a place.

The same thesis has been upheld with regard to death,² which is produced suddenly or as the result of syncope.

But this is entirely too simple a view of the question. In the first place joy, in so far as it is a state of consciousness, could not

¹ Féré, *Pathologie des émotions*, pp. 293, 294.

² For the facts, authentic or not, see Féré, *loc. cit.*, p. 233.

have this result. The catastrophe is incapable of being explained except by sudden and violent organic disorders, which could have the indicated effect only on predisposed subjects. It is not joy that kills or drives persons insane, but the shock received by a creature abnormally conditioned. It would be more correct to say that an event which in the common run of men ought to cause joy, produces in the instance in question a particular pathological state which ends in insanity or death.

2.

The reverse side may be treated rapidly. Rare cases are met with of people who are pained at the good fortune falling to their lot: they have the pain of pleasure. I do not know of their having been treated by psychologists, and it does not seem to me worth while to undertake their study. The very opposite in form to the pleasure of pain, it resembles the latter in its foundation. The state of mind met with in certain pessimists is rightly called eccentric or bizarre; the general opinion regards it instinctively as a deviation, as an anomaly. Furthermore, this is but a particular case of a more general condition of existence, namely, of morbid or pathological despondency, which we shall now study. I remarked above that since pain and despondency involve always an element of disease, the expression *abnormal* would be more exact, or less exposed to criticism.

To determine whether a physical or moral pain falls without the rule and should receive the designation abnormal, we have recourse to the three criteria laid down at the beginning of this article, and we may take as a single type *melancholia* in its medical sense. It presents the required characters: long duration, disproportion between the cause and the effect felt, excessive or deficient reaction.

A description of the melancholic state is superfluous, as it may be found in all treatises on mental diseases. The affection has many clinical forms varying from *melancholia attonita* or melancholy with stupor to the cases marked by excitement and incessant groaning, from very light forms to the severe and incurable states. It

will suffice for our present purpose to point out its most general characters. In comparing melancholia with ordinary despondency we are practising the method of amplification or enlargement, the morbid state being simply the normal state in excessive relief.

1. We know that the physiological characters of normal pain are reducible to a single formula : depression of the vital functions. The rule also applies to melancholia ; but here the organic depression is much more marked. Constriction of the vaso-motor nerves, whence result a diminution of the size of the arteries, anæmia, coldness of the extremities ; decrease of the cardiac pressure, which may drop from a mean of 800 grammes to 650 or even to 500 ; progressive slackening of the nutrition, with the various symptoms which result therefrom ; digestive troubles, stoppage of the secretions ; slow and infrequent movements, aversion to all muscular effort, all toil, all exercise of the body ; the only exception being in cases of acute melancholia, where there are periods of disordered reflexes and attacks of violent rage. Such is the general picture. We see that it is that of pain pushed to the limits, and that we find here also, as in the normal form, passive and active pains.

2. The psychical characters consist first of an affective state, which varies from stolid resignation to despair ; some patients are so completely effaced that they believe they are dead. It has been observed that generally sad characters run to melancholia, and that gay characters tend more to mania : both being exaggerations of the normal state. The intellectual condition consists in a weakening of the association of ideas, in a sluggishness of mind. Ordinarily, a fixed idea predominates, excluding from consciousness everything that is not in accord with it. Thus, the hypochondriac thinks of nothing but his health. A patient suffering from nostalgia thinks only of his country or home, and those afflicted with religious melancholy, only of their salvation. The activity of the will is almost zero ; aboulia, "the consciousness of all absence of desire is of the very essence of the malady" (Schüle). At times there are violent and unexpected reflex impulses, constituting a fresh proof of the effacement of the will. In fine, whilst normal despondency has its moments of remittance, melancholia is a prison-house of pain, in

whose impenetrable walls there is no fissure by which a ray of joy can penetrate.

And here arises a question which we cannot neglect, for it is connected with the thesis we have upheld: the fundamental rôle of the affective life. Passive melancholia being taken as the type of the painful state in its permanent and extreme form, what is the origin of that state? Two answers are possible. It may be assumed that a physical pain or a definite image engenders the melancholic disposition and poisons the affective life. It may be assumed that a vague and general state of depression and of disorganisation is constituted and takes fixity in the shape of an idea. On the first hypothesis the intellectual state comes first and the affective state is but its effect. On the second hypothesis, the affective state is first and the intellectual state the result.

This problem, which is less practical than psychological, has engaged the attention of very few alienists. Schüle¹ assumes both origins. At times the patient, suffering with a painful depression which is without cause and which he cannot get rid of, accepts matters as they are; but most frequently he connects his vague feeling of pain with some prior or present event of his life. At times, though still more rarely, the dominant idea appears first, and forms the pivot of the melancholic state and of its sequel. Dr. Dumas, who has devoted a special work to this question,² from his own observations comes to the same conclusion as Schüle. One of his patients attributed her incurable despondency, in turns and without sufficient reason, to her husband, to her son, or to the work which she feared she was neglecting. In others, the origin was intellectual: loss of fortune, the idea of irrevocable damnation, etc. Whence the author was led to assume: (1) a melancholia of organic origin, which is most frequent; (2) a melancholia of intellectual origin, which is extremely rare.

Can the two forms in which this malady appears, be referred to

¹Schüle, *Traité clinique des maladies mentales*. Art. "Melancolie," French translation, pp. 21, 28.

²G. Dumas, *Les états intellectuels dans la melancolie*. A number of detailed observations will be found here.

a common and deeper cause? Such is the aim of the following solution of Krafft-Ebing: "It is necessary to consider psychical pain and the inhibition of ideas as co-ordinate phenomena, and then we shall be in a position to discover for these variations a common cause, namely, a nutritive disorder of the brain (anæmia?), leading to a lessened expenditure of nervous activity. Viewed comprehensively, melancholia may be regarded as a morbid state of the psychical organ founded on nutritive disorders and characterised on the one hand by a feeling of pain and a particular mode of reaction for the whole of consciousness (psychical neuralgia) and on the other by the difficulty of psychical movements (instincts, ideas), and finally, by their inhibition."¹

I should be loth to incur the reproach of extracting from the facts more than they contain, and of securing unity no matter at what cost. But it follows from the foregoing that if the affective state is not everywhere and always the original state, it is at least most frequently so. Besides, it is intimately connected with trophic disorders which are fundamental, so that we may reach the same conclusion by a different way. Dumas (*loc. cit.*, p. 113 et seq.) has insisted on the depressing effects of paludism, on the torpor, the physical and moral apathy of the inhabitants of Sologne, Dombes, Maremma, and other regions infested with malaria, which may be epitomised in two words, despondency and resignation. These effects are all in favor of the organic origin of melancholic maladies.

The special study of the anomalies of pleasure and of pain is not only important in itself. The formula generally accepted since Aristotle, which couples pleasure with what is beneficial and pain with what is detrimental, is subject to many exceptions in practice. Perhaps the establishment of a pathological group in the study of pleasure and pain, will enable us to resolve some of the difficulties of this subject and prevent the rule and the anomalies from being placed on the same plane and from being unduly confounded. It extricates us from embarrassing questions and furnishes a plausible explanation in a number of cases.

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TH. RIBOT.

¹ Krafft-Ebing, Vol. II., Section I., Chap. 1.

CHINESE PHILOSOPHY.¹

INTRODUCTORY.

CHINESE philosophy is as peculiar as the Chinese language and Chinese customs, and it is difficult for Western people to understand its nature or to appreciate its paramount influence upon the national character of the Celestial Empire. It is a rare mixture of deep thought and vain speculations, of valuable ideas and useless subtleties. It shows us a noble beginning and a lame progress; a grand start and a dreary stagnation; a promising seed-time and a poor harvest. The heroes of thought who laid its foundations, were so much admired that none dared to excel them, and thus before the grandeur of the original genius which looms up in the prehistoric age, the philosophy of all later generations is dwarfed into timid insignificance.

The Chinese are naturally conservative because their written language is rigid and inflexible, rendering the task of forming new words extremely difficult. And the people who are hampered in forming new words are also hampered in their conception of new ideas and the discovery of new truths. But let us remember that this drawback of the Chinese script is only an incidental consequence of its extraordinary advantages. Consider that whatever changes there may have been in Chinese speech, i. e., in oral language, the Chinese scholars of to-day can read without great difficulty the books that were written two and one-half millenniums ago. Moreover, their ideographic script is more impressive and direct than our phonetic

²The Chinese characters that appear in this article were made by Mr. H. H. Clarke of the Stationers' Engraving Company, Chicago, Ill.

method of writing in which the letters must be translated into sound before they can be understood by the reader. Dr. Morrison says in the introductory remarks to his dictionary (p. 11) :

“As sight is quicker than hearing, so ideas reaching the mind by the eye are quicker, more striking, and vivid, than those which reach the mind by the slower progress of sound. The character forms a picture which really is, or, by early associations is considered, beautiful and impressive. The Chinese fine writing darts upon the mind with a vivid flash ; a force and a beauty, of which alphabetic language is incapable.”

But it is not the rigidity of their language alone that is at the basis of the Chinese conservatism, it is also the simplicity of the fundamental ideas of their world-view and the striking symbolism in which they are expressed and which makes it impossible for the Chinese to think in any other modes of thought than their own. The inviolable power of their tradition is further strengthened by an imperturbable patience and unbounded reverence for the sages of yore. The former renders the people submissive to many unheard-of abuses on the part of the authorities, while the latter keeps them in faithful adhesion to established conditions.

From time immemorial the highest ideal of Chinese thinkers has been to bow in modesty and submission to the insuperable grandeur of their ancient traditions. Criticism is very meek, originality of thought is strangled ere it can develop, and any attempted progress beyond the old masters appears to them as insanity. It is as if a Christian would dare to be better or wiser than Christ. In a word, the whole Chinese civilisation is saturated with the belief in the divinity, the perfection, and the unqualified excellence of its principles, doctrines, and institutions.

In the following pages we shall attempt to delineate in large outlines the philosophy that underlies the Chinese civilisation, and we hope that it will not only enable the reader to comprehend how the Chinese are hampered by their mode of notation in both their thought-symbols and their language, but that he will also learn to appreciate the causes which produce Chinese conservatism. For, indeed, there is in the Chinese world-conception so much that appeals to us as self-evident and on *a priori* consideration as a matter

of course, that we can understand how difficult it is for the Chinese to free themselves from the rigid forms of their traditions and adapt themselves to the more plastic modes of Western thought.

THE YANG 陽 AND THE YIN 陰

The ancient Chinese were distinguished by a mathematical turn of mind. For, while the literature of all other nations begins with religious hymns and mythological lore of some kind, the oldest documents of the Chinese exhibit arithmetical devices, two among which are known as the 河圖 *Ho T'u*¹ and the 洛書 *Loh shu*, "the map of the Ho,² or [yellow] River" and "the writing of the (river) Loh."

All Chinese scholars who have attempted to reconstruct the map of the Ho and the writing of the Loh agree in adopting a dualistic system, which conceives the world as the product of 陽 YANG and 陰 YIN.³ Yang means "bright," and Yin "dark." Yang is the principle of heaven, Yin is the principle of earth. Yang is the sun, Yin is the moon. Yang is, as we should say, positive; Yin is negative. Yang is, as the Chinese say, masculine and active; Yin is feminine and passive. The former is motion, the latter is rest. Yang is strong, rigid, lordlike; Yin is mild, pliable, submissive, wifelike. Yang was originally represented by a small, bright circle (○), Yin by a small, dark circle (●), but in their combinations these symbols were replaced by full and broken lines, "—" and "—."

The symbols of Yang and Yin are called the two *I* or "elementary forms," and the four combinations of the two *I* in twos are called the four Figures or Siang.⁴ They are as follows:⁵

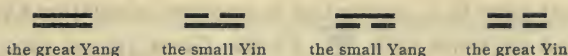
¹ The *spiritus asper* in T'u indicates that the T must be pronounced with a certain vigor or emphasis. French and German sinologists spell "Thu," which transcription, however, is misleading in English.

² Ho, the River, stands for *Hoang Ho*, the yellow river.

³ 陽 shows the symbols "place" and "spreading"; 陰 is "the shady side of a hill."

⁴ See Mayer's *Chinese Reader's Manual*, pp. 293 and 309.

⁵ *Yih King*, App. V., Chap. VII.



Groups of three or more elementary forms are called *Kwa*¹ 卦

The eight possible trigrams, or permutations of three I, possess their own names and meanings, which (according to Legge) are as follows :

KWA	NAMES		STANDING FOR	REPRESENTED BY THE
1 	chiên.	Heaven or sky.	Strength.	Horse.
2 	tui.	Lake (water collected in a basin).	Pleasure or satisfaction.	Goat.
3 	li.	Fire (the sun or lightning).	Brightness.	Pheasant.
4 	chan.	Thunder.	Energy or mobility.	Dragon.
5 	siuen.	Wind.	Penetration.	Bird.
6 	k'ân.	Moon, streams of water in motion, clouds, rain.	Sinking down, danger.	Pig.
7 	kan.	Mountain.	Arrest, standstill.	Dog.
8 	kw'un.	Earth.	Compliance or docility.	Ox.

All the things in the world, man included, are thought to be compounds of Yang and Yin elements. In this way the Chinese philosophy has become a theory of permutation, and the origin of all things is traced to a change in the combinations of Yang and Yin.

FUH-HI 伏羲 AND YÜ 禹

As to the map of the Ho and the writing of the Loh, we must state at once that nothing definite is known concerning their original form and significance. Only this much is safe to say, that tradition unanimously connects the former with 伏羲 Fuh-hi, the first emperor of China and the legendary founder of the Chinese civilisa-

² The character 卦 shows on the left-hand side "batton," on the right "to divine."

tion (about 3322 B. C., according to another calculation about 2800 B. C.), and the latter with 禹 Yü the Great (about 2200 B. C.), the founder of the second Chinese dynasty.

We are told of a great deluge that devastated the country under the virtuous Yao, the last emperor but one of the first dynasty; and that Kwen, the Minister of Works, labored in vain to control the waters. Kwen was banished for life to Mount Yü in 2286 B. C., while his duties were intrusted to his son, Yü, who at last, after nine years, in 2278 B. C., succeeded in draining the floods. Emperor Shun, the son-in-law and successor of Emperor Yao, in disregard of his own sons, raised Yü to the position of joint regent in 2224 B. C., and bequeathed to him the empire. When Shun, in 2208 B. C., died, Yü observed a three years' period of mourning, whereupon he assumed the government, in 2205 B. C.

Much may be legendary in the records of the ancient history of the Chinese, but there is no doubt that Yao, Shun, and Yü are historical personages. They represent an epoch of civilisation which, probably in more than one respect, has never been reached again by the Chinese. Public works, such as regulating the course of great rivers, were undertaken, and the sciences of mathematics and astronomy flourished. Eclipses of the sun and moon were calculated; we know that the brothers Hi and Ho observed and calculated the planetary revolutions;¹ and we possess in the Shu King documents that give evidence of manliness and moral stamina. There is, for instance, the speech² delivered by Yü's worthy son and successor, Ch'ü, at Kan in 2197 B. C., which reminds us of Frederick the Great's famous address to his generals before the battle of Leuthen. No wonder that these days of pristine glory are still remembered in the proverbial expression, "the heaven of Yao and the sun of Shun," which denotes the highest prosperity imaginable.

If the Map of Ho 河圖 and the Writing of Loh 洛書 are not to be attributed to the Emperors Fu-Hi and Yü personally, we can safely trust the old tradition, at least so far as to say, that

¹ Mayer's *Chinese Reader's Manual*, Part I., No. 900.

² *Sacred Books of the East*, III., pp. 76-78.

these two documents (whatever their nature may have been) belong to the ages represented by Fu-Hi and Yü.

THE YIH 易 AND THE KWA 卦

The ancient kwa-philosophy, as we may call the system of comprehending things as permutations of the two principles Yang and Yin, plays an important rôle in the thoughts of the Chinese people and forms even to-day the basis of their highest religious conceptions, their scientific notions, and their superstitions. With its help the origin of the world is explained, rules of conduct are laid down and a forecast of the future is made.

As to the original meaning of the kwa-philosophy, we have positive evidence of its mathematical character, not only in various suggestions of Chinese traditions, but also and mainly in the nature of the kwa themselves. It is to be regretted, however, that in times of war and civil disorder the historical connexion was interrupted. Says Chu Hi in his introduction to Cheu-tsz' 's T'ai Kih T'u:¹

"After the Cheu (dynasty) [which ruled 1122-255 B. C.] perished and Meng-Kho died, the tradition of this doctrine was not continued.

"When further the T'sin were succeeded by the Han, passing the T'sin, Sin, and T'ang, so as to arrive at our Sung [the dynasty under which Chu Hi lived] and the five planets met in the K'wei (constellation) so as to usher in an age of science and erudition, the sage [Cheu-tsz'] came."

The oldest work of Chinese literature which embodies the philosophy of Yang and Yin is the Yih King (or simply the 易 Yih), i. e., the book of permutations.²

In the Yih King we find the eight trigrammatic kwa combined into groups of hexagrammatic kwa, resulting in eight times eight or sixty-four permutations, every one of which has its peculiar name and significance. To the sixty-four permutations of the kwa hexa-

¹ See Gabelentz's German edition of the T'ai Kih T'u, p. 14.

² 經 (king) signifies a classical book of canonical authority; and 易 (yih) means "permutation"; the character shows the sun above the moon, the latter in its archaic form. The translation "change," which is commonly adopted by sinologists, does not always convey the right idea.

grams an explanatory text is added consisting of seven lines.¹ The first line, written by Wen Wang,² applies to the hexagram as a whole, and the remaining six, written by Cheu Kung,³ have reference to the six sundry lines of the hexagram, counting the lowest line as the first and the topmost as the sixth. The full lines, representing Yang, are called 九 *kiu*; the broken lines, representing Yin, are called 六 *luh*.⁴ There can be no doubt about it that in its present form the Yih King is chiefly used for the purpose of divination.

The most ancient commentaries of the Yih King have been appended to the book in the shape of three double and four simple additions called the Ten Wings. The first addition of two sections, called T'wan is commonly ascribed to Wen Wang, the second called Siang, to his son, Cheu Kung, while the rest belong to later periods, containing expositions ascribed to Confucius.

The Yih King is one of the most enigmatic books on earth, the mystery of which is considered by many beyond all hope of solution; and yet it exercises even to-day a greater influence over the minds of the Chinese than does the Bible in Christian countries. Its divine authority is undisputed and every good Chinese is confident that it contains the sum of all earthly wisdom. There is no Chinese scholar who cherishes the least doubt that there is any truth in science or philosophy that could not be found in, and rationally developed from, the Yih King.

The oldest mention of the Book of Permutations is made in the official records of the Cheu dynasty, which succeeded the Yin dynasty in 1122 B.C. There three versions of the Yih are mentioned. We read:

¹ The first and second kwa are exceptions. They possess an additional eighth line, which refers to all the six I together.

² *Wen* means "scholar," or "scholarly," i. e., "he who pursues the arts of peace." *Wang* means "king." Wen Wang received the posthumous title *Sì Peh*, i. e., "Chief of the West." His proper name is *Ch'ang*; but as it is not respectful to use the proper name, he is commonly called "Wen Wang."

³ *Kung* means "duke." *Cheu Kung* (i. e., the Duke of Cheu) was the fourth son of Wen Wang; his proper name is *Tan*.

⁴ The original meaning of 九 *kiu* is "nine," of 六 *luh* "six."

"The Grand Diviner had charge of the rules for the three Yih (systems of permutation), called the Lien-shan, the Kwei ts'ang and the Yih of Cheu; in each of them the primary figures were eight which were multiplied in each till they amounted to sixty-four."—*Sacred Books of the East*, XVI, p. 3.

The third mentioned version of the Yih is ascribed to Wen Wang, (1231–1135 B. C.), and his son Cheu Kung (1169–1116).¹

Wen Wang, a man of unusual piety and stern justice, was the most powerful vassal of the last ruler of the house of Yin,² called 紂 辛 Cheu Sin, "the dissolute tyrant." When Wen Wang had excited the wrath of Cheu Sin and of his equally brutal consort, Ta-Ki, by expressing disapproval of some of their atrocities, he was imprisoned, but after three years released through the intercession of his son Fâ, afterward called Wu Wang.³ The latter sent rich presents to Cheu Sin and with them a beautiful girl, for whose sake the tyrant gladly acceded to the requests of Fâ.⁴ While in prison at Yew Li, in 1143 B. C., Wen Wang studied the hexagrams of Fuh-Hi, and comforted himself with the propitious prophecies which he believed he discovered in their mysterious lines.

When Wen Wang died, Fâ inherited his father's kingdom. Meanwhile the tyranny of his suzerain, Cheu Sin became so intolerable that even the tyrant's own brother K'i, the prince of Wêi, fled to his court and appeared before him with an iron chain round his neck. After this event no choice was left Wu Wang. He had either to betray the confidence of K'i or to resist the unrighteous tyranny of Cheu Sin. In the spring of the year 1121 B.C. he offered a solemn sacrifice to Shang Tî, the Lord on High,⁵ and marched against his suzerain. He crossed the Hoang-Ho at the ford of

¹ The ancient rulers of China are called emperors or Tî; but the rulers of the dynasty Hia preferred the more modest title of King or *Wang*.

² The Yin dynasty is also named Shang.

³ Fâ, surnamed Wu Wang (i. e., the war king), was the oldest son of Wen Wang.

⁴ Cheu Sin (the dissolute tyrant) is a posthumous title. His proper name is "Show." The word "Cheu" in the name Cheu Sin is not the same word as the name of the principality of "Cheu," after which the Cheu dynasty is called.

⁵ 上 (shang) "above," "high in heaven," or "supreme," 帝 (tî) Lord, emperor, sovereign. The etymology of "tî" is doubtful.

Meng-tsin and gained a decisive victory in the plain of Muh. Cheu Sin shut himself up in his palace, at Luh T'ai, ordered his servants to set it on fire and died in its flames in the year 1122 B. C. Thus the Yin dynasty was superseded by the Cheu dynasty. Cheu Kung, Wu Wang's younger but more famous brother, contributed much toward the consolidation of the Cheu dynasty as chief counsellor, first of Wu Wang and then of Ch'ung, i, e., "the Perfecter," his imperial nephew and successor to the throne after Wu Wang's death.¹

There seems to be no question that the founders of the Cheu dynasty revised and rearranged the traditional Kwa systems; and the Yih of Cheu, is according to undisputed tradition, the Book of Permutations which is extant to-day.

Tradition preserves two schemes of the eight trigrams in the shape of a mariner's compass-card, in which south is always top-most. The older scheme is ascribed to Fuh-Hi, and the later one to Wen Wang. Their arrangements are as follows:

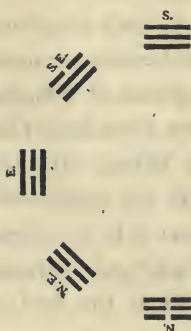


FIG. 1. THE TRIGRAM ACCORDING TO FUH-HI.

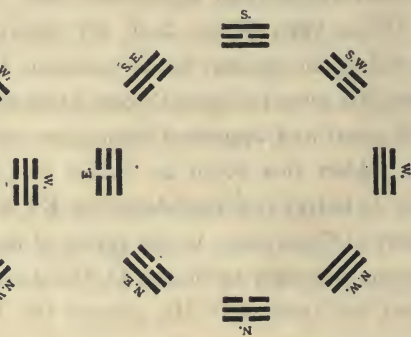


FIG. 2. THE TRIGRAM ACCORDING TO WEN WANG.

Fuh-Hi's table shows the Yang and Yin symbols evenly balanced, so that each couple of opposed kwa is made up of three full and three broken lines.

We are unable to say why Wen Wang changed the more natural order of the Fuh-Hi system. Probably he argued that if the world were arranged in the evenly balanced way of the traditional scheme,

¹ See Victor Strauss's German translation of the *Shi-King*, pp. 39-44.

it would not move, but remain at rest. Thus he naturally might have come to the conclusion that change which is the condition of the actual universe can only be due to a displacement of the regularly arranged order which would represent the elements of existence in a state of equilibrium.

One of the arrangements of the hexagrams that are met with in all the larger editions of the Yih King, consists, as can be seen in the appended diagram, of a square surrounded by a circle.

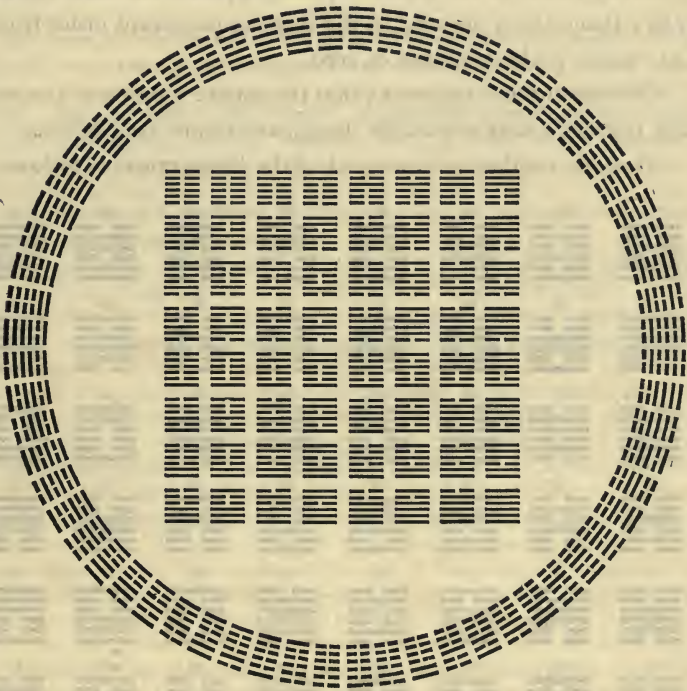


FIG. 3. THE KWA OF FUH-HI ARRANGED IN SQUARE AND CIRCLE.

In the square the sixty-four permutations of the hexagrams are arranged in the order of what may be called their natural succession; that is to say, on substituting for broken lines zero (o), and for full lines the figure "1," we can read the hexagrams as a series of numbers from 0 to 63, written in the binary system. The topmost figure in the left corner represents zero, i. e. 000000; and reading from

the left to the right, we have 1, i. e. 000001; 2, i. e. 000010; 3, i. e. 000011; 4, i. e. 000100; etc., until 111111, which, in the decimal system, is 63.

The circle contains the same symbols so arranged that those which diametrically face one another yield always the sum of 63. Thus heaven, i. e. ☰ or 63, and earth, i. e. ☷ or zero, are, the former at the top, the latter at the bottom of the circle. Beginning with zero at the bottom, the numbers ascend from 1 to 32, after which they reach, in the topmost place, opposite the zero, the number 63; thence they descend to the right in backward order from 62 to 31, which is the neighbor of zero.

Chinese authors inform us that the square represents the earth, while the circle that surrounds the square symbolises heaven.

There is another arrangement of the hexagrams, as follows :

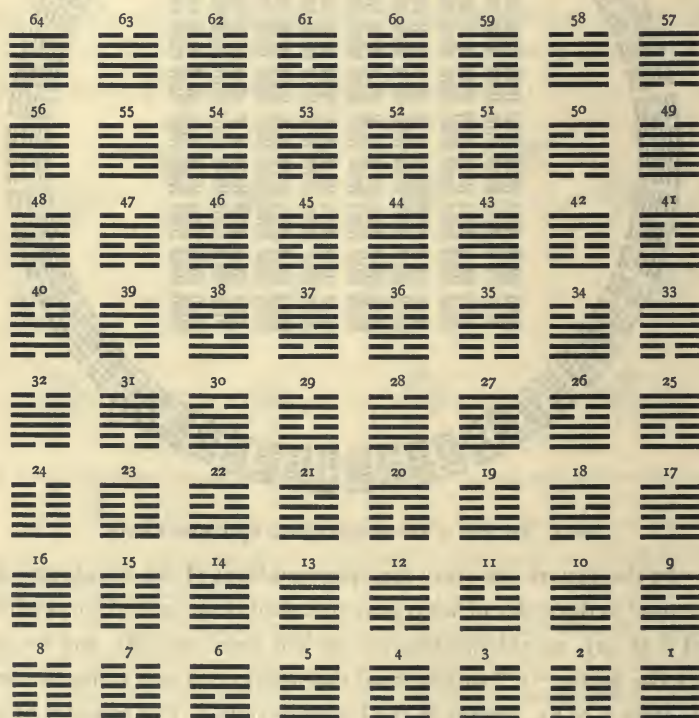


FIG. 4. THE HEXAGRAMS ACCORDING TO WEN WANG.

Beginning from the right on the bottom line, the sixty-four kwa¹ are arranged in the order of the Cheu version, ascribed to King Wen. The design exhibits in the even columns the inverse arrangement of the kwa of the odd columns, with this exception, that whenever an inversion would show the same figure, all the Yang lines are replaced by Yin lines, and *vice versa*.

Thus the hexagram No. 44, called "Kân" ䷛ is the inverted hexagram No. 43, called "Kwâi" ䷛, while "K'ien," ䷀ in No. 1, is changed into "Kw'an" ䷁ in No. 2.

¹ The names and significance of the several hexagrams depend upon the combination of the two trigrams of which each one consists. Thus, No. 1 is "sky" upon "sky," viz., the active principle doubled, which means great and successful display of energy. No. 2 is "earth" upon "earth"; the receptive principle doubled, which means, great receptivity, fertility, stability. No. 3 is "rain" above "thunder," means fulness, boding prosperity to those who are constant, but threatening impending danger to those who venture to move, etc. No. 49 is "water" above "fire," which means contrasts that confront one another; to boil; to transform (implying that fire changes the nature of water).

The names of the hexagrams, according to a Japanese authority (in the Taka-shima-ekidan), interpreted in the sense given by Western sinologists, mainly by Harlez (in his Yih King), are as follows: 1. *K'ien*, sky, success; 2. *kw'un*, earth, stability; 3. *chun*, fulness; 4. *meng*, infancy, growth; 5. *hsü*, expectancy, danger; 6. *song*, litigation, lawsuit; 7. *szê*, an army or a commander; 8. *p'î*, friendship; 9. *hsido chuh*, being clouds but no rain, little progress; 10. *li*, to march; 11. *T'âi*, penetration, no obstruction; 12. *p'ei*, obstruction, to be besieged; 13. *thong zhîn*, union, fellowship; 14. *tai yu*, great, power; 15. *k'ien*, condescension; 16. *yü*, satisfaction, grandeur, majesty; 17. *sui*, faithfulness, obedience; 18. *ku*, care, business, agitation; 19. *lin*, dignity, authority; 20. *kwen*, manifestation, show, appearance; 21. *shî hôh*, slander, censure; 22. *p'î*, embellishment, flash of light; 23. *poh*, oppression, deprivation; 24. *fâh*, reaction, return; 25. *wâ wang*, openness, sincerity; 26. *tai ch'uh*, accumulation; 27. *t*, to sustain, to feed; 28. *ta kwo*, rising of the great; 29. *k'an*, difficulties; 30. *li*, brilliancy; 31. *hien*, harmony; 32. *hang*, endurance; 33. *lun*, to retreat, to live in obscurity; 34. *ta chuang*, great strength; 35. *ts'in*, to advance; 36. *ming t*, descent, eclipse, stars; 37. *kid zhîn*, family; 38. *k'wei*, opposition, contrariety; 39. *kiên*, difficulty; 40. *kieh*, escape, deliverance; 41. *sun*, to abate, to lessen; 42. *yih*, aggrandizement, gain; 43. *kudî*, dispersion, distribution; 44. *k'êu*, to meet; 45. *tsui*, to assemble; 46. *shang*, to ascend; 47. *k'wan*, distress; 48. *tsing*, a well; 49. *koh*, water over fire, to renew, to transform; 50. *ting*, fire over wood, caldron; 51. *chan*, thunder, terror; 52. *kan*, firmness; 53. *chien*, to inchoate, to move apace; 54. *kuei*, to give in marriage; 55. *fang*, wealth; 56. *lû*, a stranger, a traveller; 57. *sün*, pliability, meekness; 58. *tui*, rejoicing; 59. *hwân*, to flow over, to squander; 60. *chieh*, law, moderation; 61. *chung*, the right way, in the middle; 62. *hsido kwô*, excess in small things; 63. *ki tsi*, consummation; 64. *wei tsi*, non-consummation.

[The translation of the names of the sixty-four kwa, as given here, only approximately agrees with the system elsewhere employed in this article.]

If regarded as binary numbers, the order of King Wen's square reads in decimal numbers as follows :

21	42	12	51	50	19	54	27
13	44	52	11	9	36	29	46
26	22	24	6	31	62	35	49
20	10	53	43	40	5	60	15
28	14	45	18	30	33	57	39
32	1	41	37	3	48	25	38
4	8	61	47	7	56	55	59
2	16	13	58	17	34	0	63

THE MILFOIL 蓍 AND THE SPIRIT TORTOISE 神龜

The divining stalks¹ and the tortoise-shell have been in use in China for the purpose of divination from time immemorial, for the practice of divination is mentioned in the oldest documents of the Shu King,² where Yü recommends "the trial by divination."

The outfit for divining 筮 by the stalks of 蓍 the divining plant (*Ptarmica Sibirica*) consists of six little oblong blocks (like toy construction-blocks) being, on two sides, divided by an incision after the pattern of the broken line of Yin and smooth like Yang lines on the two remaining sides; further, of fifty wooden stalks, a little thicker than knitting-needles. The six blocks represent Yang lines if the smooth side, and Yin lines if the incision, is uppermost. The method of divination as prescribed by the Book of Eki in the Takashima Ekidan (Keigyosha, Tokio, 1895), is as follows :

"First of all, wash your hands and mouth, clean your body, and sit perfectly aright in a quiet room, and then you may take hold of the 'sticks' very reverently. Fifty sticks make a complete set, and it must be remembered that they are the holy implements which reveal the will of the Almighty through their mathematical changes. Take out any single stick and let it stand in the stickholder,

¹Shi tsao 蓍草 the "divining plant" is a species of shi 蓍 "milfoil" the same plant which is cultivated at the tomb of Confucius. The symbol "milfoil" is composed of the three characters "plant" on the top, "old man" in the middle, and "mouth" or "to speak" at the bottom.

²Part II., Book II., § 2; *Sacred Books of the East*, III., p. 50.

which is to be placed on the centre of the table. This particular one is referred to the '*Great Origin*.' Hold the lower ends of the remaining forty-nine in your left hand, and slightly dovetail the upper ends. Apply your right-hand fingers to the middle of the sticks, the thumb being nearest to you or from inside, and the other fingers to be applied from outside. Lift the whole thing above your forehead. Now turn your sole attention to the affair to be divined, close your eyes, suspend your breath, make yourself solemn and pure, be sure that you are in interview with the Almighty to receive his order, and further, do not diversify your thoughts to anything else. At the moment when your purity of heart is at its apex, divide the sticks into any two groups with your right-hand thumb. The division must not be voluntary.

"It must be observed here that the moment when the purity of one's heart is at its apex is, in other words, the moment when one communicates with the Almighty. The feeling at the moment of the communication is impossible to describe, being like that which one feels when electric currents flow through his limbs. It is absolutely necessary that one shall divide his sticks at the very instant when he feels the feeling specified. This point of communication baffles every trial of description, the only way of acquiring the exact idea being through a continued practice and consequent dexterity of the student.

"Now, the set of the sticks is in two groups, which correspond to the '*Heaven and Earth*,' or '*Positive and Negative*,' in the terms of the '*Eki*.' Place the right-hand group on the table, and take out one from the group. This one is to be held between the ring finger and the little finger of the left hand; the figures being that of the '*Three Figures*,' namely, '*Heaven, Earth, and Mankind*.' Count the left-hand group with your right hand: it is to be counted in cycles, each cycle being four times two by two, or eight sticks per cycle. When any number of cycles has been finished, there will remain a number of sticks less than eight, including the one on the little finger. This remainder gives a complement of the destined diagram.

"If one remains you have 'Ken' (☰).

"If two remain you have 'Da' (☱).

"If three remain you have 'Ri' (☲).

"If four remain you have 'Shin' (☳).

"If five remain you have 'Son' (☴).

"If six remain you have 'Kan' (☵).

"If seven remain you have 'Gon' (☶).

"If eight or naught remains you have 'Kon' (☷).¹

"These are the eight emblems of '*Heaven*,' '*Pond*,' '*Fire*,' '*Thunder*,' '*Wind*,' '*Water*,' '*Mountain*,' and '*Earth*' in their order. The trigram corresponding to the present remainder is called the '*Inner Complement*,' and is to be placed at the

¹ Here the Japanese pronunciation of the Chinese terms is preserved.

bottom of the diagram. The above-stated process is now to be repeated, and the trigram corresponding to the second remainder is called the 'Outer Complement,' and is to be placed at the top of the diagram. Now you are in possession of a complete diagram of six elements.

"The destined diagram is now before you; the only thing left is to observe the change in the 'elements.'¹ The method of dealing out the sticks is the same as before, except the mode of counting them. Here each cycle consists of six sticks, so that three times two by two are to be counted per cycle. The remainder thus obtained expresses the element to be chosen. If your remainder is one, you have obtained the first element of the diagram; if two, the second element, etc. The order of the elements is numbered from below, that is to say, the bottom element is the first, and the top one the sixth.

"You have now thus obtained an element of a diagram."

Having thus obtained a definite element in a definite hexagram, the diviner turns to the book and reads the sentence belonging to it. This sentence is to him the oracle that he receives in reply to his question, and must be interpreted in the light of the expositions given concerning the whole hexagram. The two most important lines in the hexagrams are the second and the fifth lines, because they constitute the centre of the two trigrams of which the whole is composed. The fifth stroke, representing the efficacy of the upper or heavenly power, is always favorable, and wherever it is obtained, it bodes to the divining person luck and unfailing success.

Divination by the tortoise-shell is in principle the same. In the empty shell of the sacred tortoise, *Shan Kwei*,² which is a small species of *Emys*, three coins are shaken and thrown out in a dice-like manner. According to their showing heads or tails, an element of one of the sixty-four hexagrams is determined, and from a contemplation of the sentence attached to the element of the hexagram, as applied to the given situation, the outcome of the proposed action is anticipated.

The Chinese conception of the spirituality of the divining stalks and the tortoise shell is expressed in the third Appendix of the Yih King as follows :

¹ Viz., "of the particular line in the hexagram."

² 神 *shan*, consists of "divine" and "to extend"; while 龜 *kwei*, is "intended to represent the general appearance of a tortoise" (Williams).

"Therefore heaven produced the spirit-like things,¹ and the sages took advantage of them. (The operations of) heaven and earth are marked by (so many) changes and transformations; and the sages imitated them (by the means of the Yi). Heaven hangs out its (brilliant) figures from which are seen good fortune and bad, and the sages made their emblematic interpretations accordingly."

Divination is practised officially in China by imperial diviners. We read in the counsels of Yü that Shun submitted the question of succession to divination, and abided by its decision in somewhat the same way as among the Israelites problems of grave importance were settled by consulting the oracle of Urim and Thummim.

The seventh division of the Great Plan gives the following instruction to rulers concerning the practice of divination :

"Officers having been chosen and appointed for divining by the tortoise-shell and the stalks of the milfoil are to be charged to execute their duties. They will predict rain, clearing up, cloudiness, want of connexion, and disturbances, through the inner and outer diagrams.

"In all there are seven (examinations of doubt) : five given by the shell, and two by the stalks ; and through them all errors can be discovered.

"The officers having been appointed, when the divination is inaugurated, three men are to interpret the indications, and the consensus of two of them is to be followed.

"When you have doubts about any great matter, consult with your own mind ; consult with your high ministers and officers ; consult with the common people ; consult with the tortoise-shell and divining stalks.

"If you, the shell, the stalks, the ministers and officers, and the common people, all agree about a course, it is called a great concord, and the result will be the welfare of your person and good fortune to your descendants.

"If you, the shell, and the stalks agree, while the ministers and officers and the common people oppose, the result will be fortunate.

"If the ministers and officers, with the shell and stalks, agree, while you and the common people oppose, the result will be fortunate.

"If the common people, the shell, and the stalks agree, while you, with the ministers and officers, oppose, the result will be fortunate.

"If you and the shell agree, while the stalks, with the ministers and officers, and the common people, oppose, internal operations will be fortunate, and external undertakings unlucky.

"When the shell and stalks are both opposed to the views of men, there will be good fortune in being still, and active operations will be unlucky."

¹ The divining stalks and the divine tortoise-shell

In justice to the original Chinese conception of divination we must state that it was not intended to discover future events, but to ascertain whether or not certain plans contemplated for execution would be propitious. The tortoise-shell and the stalks are called spiritual, not because they were supposed to be animated by spirits, but because, like books and pens, they can be employed for the fixation and clarification of thought. Sz' Ma, the most skilful diviner in the time of Ts'in (fifteenth century), is reported in the Lin Chi of the Ming dynasty to have said to Shao P'ing :

"What intelligence is possessed by things spiritual ? They are intelligent (only) by their connexion with men. The divining stalks are so much withered grass ; the tortoise-shell is a withered bone. They are but things, and man is more intelligent than things. Why not listen to yourself instead of seeking (to learn) from things ?"

Spiritual accordingly does not mean possessing spirit in the sense of being animated ; it means that which is significant or is possessed of meaning.

THE MAP OF HO 河圖 AND THE WRITING OF LOH 洛書

The first authentic passages in which 河圖 the map of Ho and 洛書 the writing of Loh are mentioned, date as far back as the age of Confucius. We read in the Yih King, Appendix III., 73 :

"The Ho gave forth the map, and the Lo the writing."—*S. B. E.*, XVI., p. 374.

In the Lun Yü (the Confucian Dialogues), V., 7, we read that Confucius said in an hour of dejection :

"The bird Feng does not longer reappear, from the river no map comes up again :¹ I am disappointed in my expectations."

The first author who appears to have given a definite shape to the legends of the map of Ho and the writing of Loh is K'ung Ngan-Kwoh, a descendant of Confucius (second century, B.C.). He

¹ This means in other words that divine revelation by a direct supernatural interference has ceased. The bird Feng (see Fig. 6) is like the Phoenix a mythical creature whose appearance is said to announce great events. *Feng*, the Chinese Phoenix, and *lung*, the dragon, are favorite subjects of Chinese artists. The female of the Phoenix is called *Hwang*, hence the generic term *Feng-Hwang*, which is the emblem of conjugal happiness. *Lung*, the dragon (see Fig. 5), is the emblem of power ; hence it is the imperial coat-of-arms.

speaks of the dragon-horse that emerged from the waters of the Yellow River and presented on its back an arrangement of symbols, whence the divine ruler Fuh-Hi, derived his philosophy. Concerning the writing of Loh, K'ung Ngan-Kwoh adds that while Yü was engaged in draining the flood a spirit tortoise appeared to him which "carried on its back a scroll of writing and a system of divisions, in both respects exhibiting the numbers up to nine."

There is but one celebrated Chinese scholar, Ow-yang Sin, who ventured to express disbelief in the legend while the schoolmen of the Sung dynasty devoted themselves to a reconstruction of the



FIG. 5. LUNG, THE DRAGON. (As it appears in the imperial standard.) The lung is "the chief of scaly beings." It symbolises the watery principle of the atmosphere. Cosmogonists mention four kinds. In addition we read of the yellow dragon (the same that emerged from the river Loh) and the azure dragon.



FIG. 6. THE BIRD FENG. (After a Chinese drawing. Reproduced from the *Chinese Repository*.)

map of Ho and the writing of Loh. The schemes that have gradually been accepted are the two diagrams reproduced on p. 206 from a Chinese edition of the Yih King. They were elaborated by Ts'ai Yuen-Ting who lived under the Hwei Tsung dynasty (1101-1125 A. D.).

The Ho T'u, or map of the Ho, according to Ts'ai Yuen-Ting, shows the odd numbers 1, 3, 5, 7, and 9 in white dots or Yang symbols, and the even numbers 2, 4, 6, 8, and 10 in dark dots or Yin symbols. (See Fig. 7.) This is based upon the theory of the Confucian commentary of the Yih King, which reads as follows :

"The number 1 belongs to heaven ; to earth, 2 ; to heaven, 3 ; to earth, 4 ; to heaven, 5 ; to earth, 6 ; to heaven, 7 ; to earth, 8 ; to heaven, 9 ; to earth, 10.

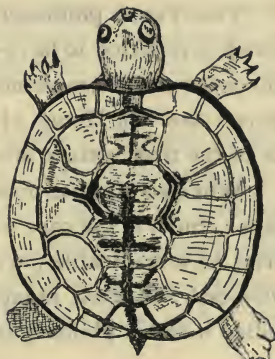
"The numbers belonging to heaven are five, and those belonging to earth are five. The numbers of these two series correspond to each other (in their fixed positions), and each one has another that may be considered its mate. The heavenly

Although these two arithmetical devices of the map of Ho and the writing of Loh according to Ts'ai Yuen-Ting are spoken of as commonly accepted, we find another and almost more popular scheme of unknown origin and perhaps of greater antiquity, according to which the map of Ho on the back of the river-horse is said to exhibit the eight kwa, as represented in the adjoining illustration (see Fig. 9), and the writing of Loh on the back of the tortoise is identified with the five elements (see Fig. 10).

The inscription above the dragon horse reads from the right to the left "Lung ma fu t'u," i. e. dragon horse carrying map.



FIG. 9. THE DRAGON HORSE CARRYING THE MAP.

FIG. 10. THE TORTOISE WITH THE WRITING.¹

The five elements 五行² according to Chinese notions, are water, wood, fire, metal, and earth.³

水 木 火 金 土

¹ Drawn after the photograph of a specimen in the possession of Dr. H. Riedel. The writing of the five elements which might be similarly traced in various ways, is unduly emphasised, for the purpose of showing it at a glance.

² 行 *hing* = "element" exhibits two characters, "a step with the left foot," and "a step with the right foot," which combined denote "motion." The elements, accordingly, are "the moving ones," or "the active agents."

³ 水 *shui*, 木 *muh*, 火 *hwo*, 金 *kin*, and 土 *T'u*. *Shui* = "water" is in its original form the picture of three ripples; *muh* = "wood," the picture of a tree with its roots; *hwo* = "fire" represents an ascending flame; *T'u* = "earth" denotes the place on which to stand; and *kin* = "metal or gold" is said to contain the character *T'u* = "earth," because the metals come from the ground.

They were, in old Chinese characters,¹ written as follows :



We need little imagination to trace these characters on the shell of a tortoise, such as sketched in the drawing on page 207 (Fig. 10).

The five elements play a very important part in the thoughts of the Chinese. In their symbolical significance they represent the properties or actions that appear to be inherent in them. Their conception is of considerable antiquity, for it is mentioned in the Great Plan of the Shu King.

Tseu Yen, a philosopher who lived in the fourth century before Christ, is reported to have composed treatises on cosmogony and the influences of the five elements. Other sages who wrote on the same subject are Liu Hiang of the first century before Christ, and Pan Ku of the first century after Christ.

When an idea has once gained a foothold in the Chinese mind, it stays. Such is the case with the notion of the five elements, which forms an ineradicable part of the Chinese world-view, so that even Cheu-tsz', the most independent thinker of later generations, embodied it in his philosophy.

THE GREAT PLAN 洪範 IN NINE DIVISIONS 九疇

The Count of Chi, the grand master at the court of Shang, in the time of the tyrant Cheu Sin, said once that if ruin overtook the house of Shang, he would never be the servant of another dynasty. Having displeased Cheu Sin, he was put into prison, and when the former died in the flames of his burning palace, his conqueror, Wu Wang, released the grand master from prison, but the latter, faithful to his vow, refused to acknowledge his liberator as the legitimate sovereign of China. Wu Wang, honoring the independent spirit of the Count, allowed him to leave the country for Corea, and invested him with that territory. Hereupon the Count felt constrained to appear at the court of Cheu, when consulted by

¹ In the so-called seal characters, the forms of *shui* and *muh* appear less angular and are rounded at the corners.

Wu Wang on the principles of government, and communicated to him the **洪範** Great Plan,¹ with its nine divisions. Its translator, Professor Legge, says:

"The Great Plan means the great model for the government of the nation,—the method by which the people may be rendered happy and tranquil, in harmony with their condition, through the perfect character of the king, and his perfect administration of government."

The Great Plan is preserved among the documents of Cheu, but it is generally supposed to be of much older date. Says Legge:

"That the larger portion of it had come down from the times of Hsiâ is not improbable. The use of the number nine and other numbers, and the naming of the various divisions of the Plan, are in harmony with Yü's style and practice in his Counsels. We are told in the introductory sentences that Heaven or God gave the Plan with its divisions to Yü."

The Great Plan is interesting as a sample of Chinese philosophy. Its metaphysical basis consists in a mystical play with numbers, the reasons of which can no longer be fully appreciated; it contains a great many confused notions of physics, mixed with divination and astrology, and in addition some very practical injunctions for the moral conduct of rulers. The nine divisions² of the Great Plan are as follows:

1. The five elements.—They are characterised as follows:

"The nature of water is to soak and descend; of fire, to blaze and ascend; of wood, to be crooked or straight; of metal, to yield and change; of the earth, to receive seeds and yield harvests. That which soaks and descends becomes salty; that which blazes and ascends becomes bitter; that which is now crooked and now straight becomes sour; that which yields and changes becomes acrid; and from seed-sowing and harvesting comes sweetness."

2. Reverent attention to the five points of conduct.—It prescribes (1) for deportment, a reverent attitude, (2) for speech, pro-

¹ **洪** *hung*, literally "vast, immense," but in connexion with **範** *fan*=plan, the word is commonly translated "great." The character consists of "water," which is the same radical as in the names *Ho* and *Loh*, and of "all," its original significance being "inundation." See Williams, *Syllabic Dictionary of the Chinese Language*, p. 236.

² **疇** (*ch'eu*=division) consists of "field" and "long life."

priety, (3) for seeing, clearness of vision, (4) for hearing, distinction, (5) for thinking, acumen. By the observation of these five points of conduct will be insured (1) gravity, (2) decorum, (3) circumspection, (4) discernment, (5) wisdom.

3. Earnest devotion to the eight objects of government.—They are (1) the provision of food for the people, (2) the acquisition of wealth, (3) the performance of sacrifices, (4) the regulation of labor, (5) the organisation of instruction, (6) the suppression of crime, (7) the entertainment of guests, and (8) the maintenance of the army.

4. The five arrangers of time.—They are (1) the year, (2) the moon, (3) the sun, (4) the planets and the zodiacal divisions, and (5) calendar calculations.

5. The ideal of royal perfection.—It is characterised in the following lines :

“ Without deflection, without halting,
Pursue the royal righteousness.
Without selfish preference,
Pursue the royal way.
Without selfish prejudice,
Pursue the royal path.
Avoid deflection, avoid partiality;—
Broad and long is the royal way.
Avoid partiality, avoid deflection;—
Level and easy is the royal way.
Avoid perversity, avoid one-sidedness;—
Correct and straight is the royal way.
(Ever) seek for this perfect excellence,
(Ever) turn to this perfect excellence.

“ This ideal of royal perfection is unalterable and implies a command;—yea, it is a command of the Lord on High.

“ All the multitudes of the people, instructed in this ideal of perfect excellence, will, by carrying it into practice, partake of the glory of the Son of Heaven. They will say: ‘ The Son of Heaven is the father of the people, and the sovereign of all nations under the sky.’ ”

6. The three virtues of a ruler are righteousness, severity, and clemency. The first must be practised in times of tranquillity, the second serves to put down disorder, and the third applies to high-minded persons.

7. The examination of doubts prescribes the directions of divination, as explained above. (See p. 203.)

8. The eight ways of verification are astrological rules for the prevention of misfortunes. Rain, sunshine, heat, cold, and wind must be seasonable, lest evil originate. Gravity in deportment produces rain, propriety sunshine, prudence heat, circumspection cold, and wisdom wind, each in season. The king should examine the year, the ministers the months, the officers the days, in order to insure peace and prosperity. If the seasonableness is interrupted, there will be failure of crops and misgovernment. If great men are kept in obscurity, there will be unrest. The chapter concludes: "The stars should be observed by the people at large. Some stars love wind, and others love rain; the courses of the sun and moon determine winter and summer. The way in which the moon follows the stars produces wind and rain."

9. The five sources of happiness are (1) long life, (2) riches, (3) health and equanimity, (4) virtue, and (5) obedience to the will of heaven; and the six sources of misery are (1) shortness of life, (2) sickness, (3) anxiety, (4) poverty, (5) wickedness, and (6) lack of character.¹

In spite of its lack of system and its diverse aberrations from the straight path of sound logic, the Great Plan has exercised, on account of its moral ingredients, a beneficial influence upon the development of China. Yet even here there is a drawback, in so far as the basis of Chinese ethics consists merely in reverence for the past, for parents, and for authority in any form; it lacks the most essential elements that give character to conduct, which are independence of thought, the courage of individual responsibility, and bold progressiveness.

THE T'AI KIH, 太極 THE ULTIMATE GROUND OF EXISTENCE.

The insufficiency of the dualism which finds expression in this contrast of the Yang and Yin principles, must have made itself felt

¹ It is hard to understand why in one case there are five, and in another six sources.

very early, for the Chinese philosophy, as it appears in all the classics, exhibits a decided tendency towards monism. The Yang and Yin are thought to have originated in a process of differentiation from the T'ai Kih, which is "the grand origin," *der Urgrund*, the source of existence; Gabelentz translates it, *das Urprinzip*, Legge and other English sinologists, "the grand terminus," or "the grand extreme." Its symbol is a circle, thus ○.

The word T'ai, 太 "great" or "grand," is akin to Ta, 大 "great" or "large"; it implies that the greatness is not of size, but of dignity.

Gabelentz defines the word 極 Kih¹ as follows:

"Kih originally signified, as is indicated by its radical (which is No. 75, 'tree,' or 'wood'), the ridge-pole in the gable of a house. Because it is the topmost part of the building, the term is used of all topmost and extreme points. Since we cannot go beyond the top of the gable, but only cross over to descend on the other side of the roof, Kih means 'goal,' or 'turning-point.' This latter meaning implies the idea of neutrality, which is neither on this nor on that side. As is well known, the Chinese words possess the functions of various parts of speech. Thus Kih, as adverb, means 'very, highly, extremely'; as a verb, 'to reach the goal, to exhaust.'"

The T'ai Kih 太極 is not mentioned in the body of the text of the Yih King, but is commonly believed to be implied in its secret teaching. This opinion appears to have been established as early as the time of Confucius, who is reported to have said:

"Therefore in the Yih is contained the great origin, which produced the two elementary forms [viz., Yang and Yin]. The two elementary forms produced the eight trigrams. The eight trigrams served to determine good and evil, and from their determination was produced the great world."—*Yih King*, App. III., §§ 70-71.

Legge criticises the author of this paragraph, because there is no way of deriving the full and broken lines, representing Yang and Yin, from the circle, and we grant that there is a gap here. The transition from the Yang-and-Yin dualism to the monism of the T'ai Kih did not find its appropriate symbol. Nevertheless, we can understand that the idea necessarily originated. Wang Pî,² a cele-

¹ See also Williams, *S. D. of the Ch. L.*, p. 393.

² Although Wang Pî died at the early age of twenty-four years, his authority in the mystic lore of the Yih King was so great that he is looked upon as the founder of the modern school of divination.—Mayer's *Chinese Reader's Manual*, I. I., No. 812.

brated scholar of the Wei dynasty (born 225 A. D.), (as quoted by Legge, *ib.*) says:

"Existence must begin in non-existence, and therefore the Grand Terminus produced the two elementary forms. *Thâi K'î* [viz. *T'ai Kih*, the grand terminus] is the denomination of what has no denomination. As it cannot be named, the text takes the extreme point of anything that exists as an analogous term for the *Thâi K'î*."

Professor Legge adds:

"Expanding Wang's comment, *Khung Ying-tâ* says: '*Thâi K'î* [viz. *T'ai Kih*] means the original subtle matter, that formed the one chaotic mass before heaven and earth were divided;' and then he refers to certain passages in *Lão-tsze's Tâo-Teh-King*, and identifies the *Thâi K'î* with his *Tâo*. This would seem to give to *Thâi K'î* a material meaning. The later philosophers of the Sung school, however, insist on its being immaterial, now calling it *lí*, the principle of order in nature, now *tâo*, the defined course of things, now *Tí*, the Supreme Power or God, now *shan*, the spiritual working of God. According to *K'ang-tze* [Confucius], all these names are to be referred to that of 'Heaven,' of which they express so many different concepts."

We here reproduce a diagram of the evolution of the *Kwa* from the Great Extreme, which, so far as we know, has never been reproduced in any Western translation of the *Yih King*.

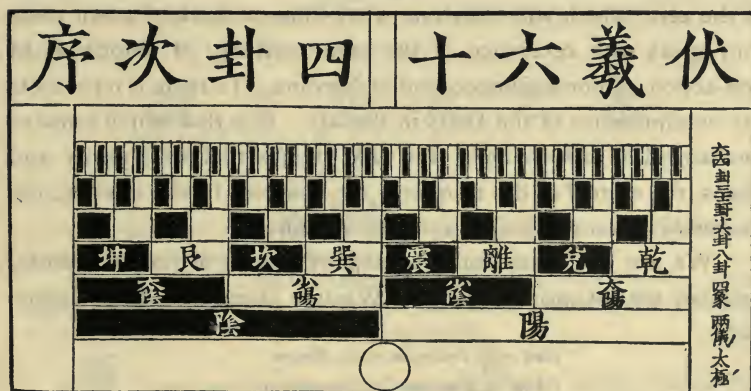


FIG. II. THE DESIGN OF KWA-EVOLUTION FROM THE GREAT EXTREME.
(From a Chinese edition of the *Yih King*.)

The eight characters of the title in Fig. II read from the right to the left:

伏 *Fuh* 義 *Hi's* 六 *six-* 十 *ty* 四 *four* 卦 *Kwa* 次 *serially*
(or in their development) 序 represented.

The marginal notes from below upward read "the great extreme," "the two *I*" (or primordial forms), "the four Siang or figures," "the eight kwa," "the sixteen kwa," "the thirty-two kwa," "the sixty-four kwa."

The inscriptions in the two large black and white rectangles immediately above the circle read from the right to the left "yin" and "yang," in the second line from below consisting of two black and two white rectangles, "the great yin," "the small yang," "the small yin," "the great yang," in the third line "ch'ien, tui, lî, chan, siuen, k'ân, kan, and kw'un," which are the names of the eight Kwa, as quoted above. The thirty-two Kwa have no names. The names of the sixty-four hexagrams are written in the Chinese original over the small sixty-four rectangles at the top. They are here omitted because they would have appeared blurred in the present reproduction, which is considerably reduced.

If we fold the diagram in the middle we find that the yin and yang differentiations of the great origin cancel one another and the whole world sinks back into nought. This symbolises the omneity of the zero, which will illustrate what Chinese thinkers mean when they speak with reverence of the great nothing, of emptiness, of non-action, of non-existence, and of Nirvâna. To them it represents the omnipresence of the Deity in the All. It is that which remains unchanged in all changes, the law in apparent irregularity and chaos, the eternal in the transient, the absolute in the relative, the universal in the particular, and rest in motion.

We are not accustomed to negative terms in just this sense, but they are not entirely absent in Western literature. Thus Goethe says:

*"Und alles Drängen, alles Ringen
Ist ew'ge Ruh' in Gott dem Herrn."
[Yet all the strife and all resistance
In God, the Lord, 's eternal rest.]*

THE MONISM OF CHINESE PHILOSOPHY, OR CHEU-TSZ'S 周子 PHILOSOPHY.

The monism implied in the unitary and ultimate principle of the T'ai Kih was worked out by Cheu Tun-i, commonly called Cheu-

tsz', i. e. Cheu the Sage, who lived 1017-1073. We do not hesitate to say that Cheu-tsz' is the first systematic thinker of China; he certainly deserves the honorary title, Tao-Kwoh-Kung, "Prince in the Empire of Reason," conferred upon him after death. Lao-tsz' may be deeper, Confucius more influential, Mencius more versatile, but none of them is more methodical, none of them is more precise and clear in comprehension than Cheu-tsz', and there is only one who, in this particular line, is his equal: his great disciple, Chu Hi.

Cheu-tsz' and his school have systematised and completed the philosophical world-conception of the Chinese. Whatever the ancient traditions may have been, they are now understood in China as interpreted by Cheu-tsz' and Chu-Hi.

Cheu-tsz' has written a famous booklet, *T'ai Kih T'u*, or the diagram of the Great Origin, which is excellently translated into German by Georg von der Gabelentz.¹

Cheu-tsz' has written a great number of works, but besides the *T'ai Kih T'u*, there is one other booklet only that has come down to our times. This is the **通書** *T'ung Shu*,² or "general treatise," which found an expositor in Chu-Hi (1130-1200 A. D.). The first sentence of the *T'ung Shu* reads:

誠 者 聖 人 之 本

"Truth fulness³ [is] the holy man's root."

¹ *T'ai Kih T'u* **太極圖** *des Tscheu Tsi, Tafel des Urprincipes mit Tschu-Hi's Commentare.* Dresden, 1876.

The *T'ai Kih T'u* is the first chapter of the *Sing ti ta tseuen* (literally, "nature principle in full completeness," or, better, "philosophical encyclopædia") published in 1415 by the third sovereign of the Ming dynasty.

² **通** *T'ung*, general, universal, abstract, **書** *Shu*, writing, treatise, book. The *T'ung Shu* is the second chapter of the *Sing ti ta tseuen*.

When at the request of Emperor Kanghi an abridged edition of the philosophical encyclopædia was published in 1717, both treatises of Cheu-tsz' were again embodied in the collection in their complete form together with Chu-Hi's annotations. This proves the high esteem in which these two thinkers are held in China, and, indeed, their opinions are recognised as the standard of Chinese orthodoxy.

³ The second word, **者** *che*, means "thing," or "substance"; it changes its preceding word into a noun, just as does the English word "one" in such clauses

What a deep and after all clear and true idea is expressed in these simple words ! And yet Cheu-tsz' 's treatise will be disappointing to a Western reader, for in the progress of his exposition our philosopher interprets virtue in terms of the Yang and Yin system. He says in § 2 :

“Great is the Ch'ien's 乾 origin. All things thence derive their beginning (It is) Truth's source indeed !”

乾 Ch'ien is the first combination of three Yang elements, (☰), and stands in contrast to 坤 Kw'un (☷), the pure combination of three Yin elements ; the former symbolises “heaven, virile strength, manhood, creative power” ; the latter, “earth, stability, womanhood, productiveness.” This is one striking instance, among innumerable others that can be found in Chinese literature, of how deeply even the most powerful minds, with the sole exception of Lao-tsz', are entangled in the Yang and Yin philosophy that looms up at the mythical beginning of Chinese civilisation and still rules the thought of the Celestial Empire to-day!

Cheu-tsz' condenses the contents of his treatise on the Grand Extreme in a diagram which we here reproduce. (See Fig. 12, p. 217.)

Thomas Taylor Meadows says of Cheu-tsz' in his book, *The Chinese and Their Rebellions*, p. 358.

“It is in the spirit of coalescence, and with a full personal faith in a virtual identity of the teachings of the Sacred Books, that all Cheu-tsz' 's annotations and commentaries were conceived. This circumstance, which rendered it unnecessary for his countrymen, in adopting his views, to discard any part of what they had long so highly esteemed ; together with the fact that his style combined, in a wonderful degree, simplicity with completeness and lucidity with eloquence, procured unmistakable supremacy for his writings soon after his death ; and constituted him the definitive fashioner of the Chinese mind.”

CHU HI'S DOCTRINE OF LI 理 AND K'I 氣 THE IMMATERIAL PRINCIPLE AND PRIMARY MATTER.

The mantle of Cheu-tsz' fell upon Chu Hi, also called Chu Fu Tsz', who lived 1130-1200 A. D. In his exposition of the clas-

as “the true one,” “this one,” or “that one.” The first word means “truth,” or “truthful.” Accordingly the two words mean “the truth essence,” the most appropriate translation of which seems to be “truthfulness.”

EXPLANATIONS:

Cheu-tsz' says in the T'ai kih t'u :

§ 1. "Having no cause (*Kih* = principle, origin, limit), therefore the grand (original) cause."

[This statement may be compared to Spinoza's theory of the uncaused *causa sui*.]

§ 2. "The grand cause moves, thus producing Yang. Having reached the limit, however, it rests. Resting it produces Yin. Having rested to the limit again, it moves. Once moving, once resting; one state being conditioned by the other. In separation it is (here) Yin, in separation it is (there) Yang. Thus the two fundamental forms (viz. — and — —) are fixed."

§ 3. "Yang changes, Yin is added. Thus are produced water, fire, wood, metal, and earth. The five kinds of weather are distributed. The four seasons come forth."

[Fire and wood belong to the Yang, water and metal to the Yin; while earth, standing in the centre, is neutral.]

§ 4. "The five elements if united are Yin and Yang. Yin and Yang if united are the grand cause (*Kih*). The grand cause is without cause. The five elements receive at their origin, each one its own nature."

[The circle indicates that the five elements, when combined, can be regarded as magnitudes of plus and minus which in their sum equal the zero of the T'ai kih.]

§ 5. "The truth of that which has no cause, the efficacy of the Two (viz. the two forms — and — —) and of the Five (viz. the five elements) in a wonderful way, now combine and now separate. The K'ien's (☰) norm is male, the Kw'un's (☷) norm is female. Both aspirations quicken one another, and through transformations they produce all things. All things are produced in a process of production. Thus change and transformation are infinite."



1 The "myriads of things" is a common phrase in Chinese, denoting the Universe.

太極圖

FIG. 12. CHEU-TSZ' 'S DIAGRAM OF THE GREAT ORIGIN. [After Von Gabelentz.]

sics and of Cheu-tsz' works, Chu Hi¹ leaves no doubt about the monism of his philosophy. His works were published at the request of Emperor Kanghi in a collection called *Cheu-tsz' Tseuen Shu* (i. e., the complete writings of Cheu-tsz'), containing among other essays his treatise on *The Immaterial Principle (li) and Primary Matter (K'i)*,² the first sentence of which reads, according to Mr. Meadows's translation (*l. l.* p. 373):

"In the whole world there exists no primary matter 氣 (K'i), devoid of the immaterial principle; and no immaterial principle (li) apart from primary matter."

Williams in his *Syllabic Dictionary of the Chinese Language* explains (on p. 348) 氣 *k'i* as follows:

"Fume or vapor; . . . steam; ether; the aerial fluid; breath, air; vital force; . . . spirit, temper, feelings; a convenient and mobile term in Chinese philosophy for explaining and denoting whatever is supposed to be the source or primary agent in producing or modifying motion."

Williams adds that *k'i* is more material than *li* (order) and *tao* (reason); more external than *sin* 心 (heart) and is conditioned by its form (*hing*). It is opposed to *chi* 質 (matter),³ "as Ζωή or spirit is opposed to the body it animates."

¹ See Mayer's *Chinese Reader's Manual*, s. v., Chu Hi, No. 79, and Chow Tun, No. 73; *Chinese Repository*, Vol. XIII., pp. 552 et seq. and 609 et seq.; also Williams, *The Middle Kingdom*, I., 683 et seq. Compare also Mr. Meadows's strictures on Dr. Medhurst's translation, *l. l.* pp. 372-374. Mr. Meadows's voluminous book is valuable in many respects. Having served as an interpreter in H. M. Civil Service, he knows the people and describes the conditions with great impartiality. However his criticism of other sinologists, even though correct, is too severe. He forgets the difficulties under which they labored and underrates the power of both religious and national prejudice. When we remember how greatly the nearest Western nations, such as the Germans and French, the English and Americans misunderstand one another, we must confess that the misrepresentations of sinologists are quite excusable.

The weakest part of Mr. Meadows's article on Chinese philosophy is what he is pleased to call "the unfailing pass-key to the comprehension of all difficult passages in the Chinese sacred books, as understood by the Chinese themselves," which consists in the proposition that the differences between *T'ai kih* (ultimate principle), *K'i* (ether), *Tao* (Logos), *Li* (world-order), *Sin* (heart), *Sing* (nature), *teh* (virtue), *t'ien* (heaven), *ming* (fate), *Ching* (sincerity) "are purely of a nominal kind."

² "K'i" 氣 must not be confounded with "Kih" 極

³ The character 質 *chih* shows the radical "property" above which two taels appear. Thus it may be explained as "possessing the quality of weight."

理 *li* is defined by the same authority (on p. 519) as :

"The governing principle ; that which is felt to be right and does not depend on force ; reason ; directing principle ; principle of organisation."

性 *sing*, "nature," signifies the subjective disposition of things, never the objective phenomena of the universe. The word *sing* is composed of "heart" and "to bear, to grow," denoting that which is a manifestation of the inner character of existence.

心 *sin*, "heart," means not only the physical heart, which is regarded as the lord of the body and one of the senses, but also the core of things, as the wick of a candle, or the heart-wood of trees, and the ultimate seat of desire, the origin and source of all activity.

Chu Hi (according to Dr. Medhurst's translation) continues :

"When the primary matter is not collected and combined in form, there is no lodging-place for the immaterial principle.

"The primary matter relies on the immaterial principle to come into action, and wherever the primary matter is coagulated there the immaterial principle is present.

"No priority or subsequence can be predicated of the immaterial principle and primary matter, and yet if you insist on carrying out the reasoning to the question of their origin, then you must say that the immaterial principle has the priority; but the immaterial principle is not a separate and distinct thing ; it is just contained within the primary matter, so that were there no primary matter, then this immaterial principle would have no place of attachment.

"When the primary matter is brought into being, then afterwards the immaterial principle has some place whereon to rest. In regard to great things it is seen in heaven and earth, and with respect to small, in ants and emmets."

While dwelling on the truth that the immaterial principle is inseparable from primary matter, Chu Hi yet recognises the higher dignity and priority in importance of the former, but finding no word to express precedence or superiority (i. e., priority in rank) to anteriority, (i. e. priority in time), he says :

"... And it appears to be impossible to distinguish the priority or subsequence. If you insist on it, the immaterial principle is first, but you cannot say, to-day the immaterial principle is called into existence and to-morrow primary matter ; still there is a priority and a subsequence.

"Wherever the primary matter is collected, the immaterial principle is present ; but after all, the latter must be considered as the chief ; this is what is called the mysterious junction."

Mr. Meadows translates a passage on the problem of the priority of the *li* over the *K'ü* as follows :

" Being asked whether the immaterial principle or primary matter first existed he (Cheu-tsz') said : The immaterial principle was never separated from primary matter ; but the immaterial principle is what is previous to form, while primary matter is what is subsequent to form."

Chu Hi perceives that he is dealing with an abstraction of the highest kind, an abstraction of the universal ; and we feel in the many repetitions which fill his treatise how he grapples with the problem, the solution of which he has in his mind without being able to find an adequate symbol to express it. Wherever he turns he sees inseparableness and distinctness. The immaterial principle is omnipresent in all things, and yet it is different from matter, in explanation of which Chu Hi says : " We must not consider the mud-diness of the stream to be the water."

The *li* or immaterial principle, resembles Kant's *a priori* or the purely formal,¹ the laws of which remain true not only of this actual world of ours, but also of any possible world, and even if nothing at all existed. Chu Hi attempts to express his idea thus :

" You cannot distinguish in this matter between existence and non-existence ; before heaven and earth came into being it was just the same."

The immaterial principle remains true for both existence and non-existence, but it cannot manifest itself without the existence of primary matter. Seen in this light, the last quotation will not appear contradictory to the following :

" Wherever the primary matter exists there is found the immaterial principle, and where there is no primary matter there is also no immaterial principle."

The immaterial principle is the natural order of the seasons, the principle of virtue in the moral man, the wisdom of the sage. It is, on the one hand, the mentality of sentient beings which makes comprehension possible, and on the other hand, the rationality of the universe, i. e., the cosmic order which renders the world intelligible. Chu Hi says :

¹ It is what we define in the *Primer of Philosophy* (p. 79 et seq.) as " the rigidly formal."

"That which perceives is the immaterial principle of the mind ; and that which enables it to perceive is the intelligence of the primary matter."

The immaterial principle as it affects the Yang and Yin is symbolised by a circle in which light and darkness are evenly divided. Darkness contains the seed of light, and light contains the seed of darkness.

Chu Hi identifies the immaterial principle with Lao-tsz' 's 道 Tao and with Cheu-tsz' 's T'ai Kih. He says :



SYMBOL OF THE
SOURCE
OF EXISTENCE.

"The great extreme is merely the immaterial principle of heaven, earth, and all things ; speaking of it with reference to heaven and earth, then the great extreme may be said to exist within heaven and earth. Speaking of it with respect to the myriad of things, then amongst the myriad of things¹ each one possesses a great extreme.

"The great extreme is not an independent separate existence ; it is found in the male and female principles of nature, in the five elements, and in the myriad of things. . . . Should any one ask, what is the great extreme ? I should say, before its development it is the immaterial principle, and after its manifestation it is feeling ; thus for instance, when it moves and produces the male principle of nature, then it is feeling or passion.

"At the very first there was nothing, but merely this immaterial principle.

"From the time when the great extreme came into operation the myriad things were produced by transformation ; this one doctrine includes the whole ; it is not because this was first in existence and then that, but altogether there is only one great origin, which from the substance [abstract existence ; in-itself-ness] extends to the use [to its manifestation in reality], and from the subtle reaches to that which is manifest.

"Cheu-tsz' called it the extremeless or the illimitable, by which he meant the great noiseless, scentless mystery."

By "noiseless" and "scentless" is meant the incorporeal, i.e., that which is not perceived by the senses, but can only be comprehended by the mind—as, for instance, the truth of a mathematical theorem cannot be apprehended by any one of the senses, but is a matter of pure understanding. Thus Chu Hi says :

"The immaterial principle cannot be perceived [viz., by the senses] ; but, from the operations of the male and female principles of nature [viz. the purely formal

¹ See footnote belonging to Fig. 12 on p. 217.

science of Yang and Yin permutations] we become acquainted with it; thus the immaterial principle depends (for its display) on the male and female principles of nature.

"Should any one ask, what is the great extreme? I would say, the great extreme is simply the principle of extreme goodness and extreme perfection. Every man has got a great extreme; every thing has got a great extreme; that which Cheu-tsz' called the great extreme is the exemplified virtue of everything that is extremely good and extremely perfect in heaven and earth, men and things."

We would say, "it is every one's ideal," as Rückert expresses it:

*"Vor jedem steht ein Bild des, das er werden soll,
Und vor er es nicht ist, ist nicht sein Friede voll."*

[An image of what it ought to be lives in each creature's mind
So long as that is unattained, its peace it cannot find.]

We can scarcely appreciate the difficulties which Cheu-tsz' and Chu Hi had to overcome in the dualistic terminology of their national tradition. The term T'ai Kih (Great Extreme) dates back to earlier days, but the monistic conception derived from its application was new; and it was a triumph of philosophical thought which their inventors, considering the circumstances of the situation, had good reasons to prize highly. Chu Hi says:

"The great extreme is the immaterial principle of the two powers, the four forms, and the eight changes of nature; we cannot say that it does not exist, and yet there is no form or corporeity that can be ascribed to it. From this point is produced the one male and the one female principle of nature, which are called the two powers; also the four forms and the eight changes proceed from this, all according to a certain natural order, irrespective of human strength in its arrangement. But from the time of Confucius no one has been able to get hold of this idea. Until the time of Sháu Kangtsie, when this doctrine was explained, and it appeared very reasonable and pleasing. It may not therefore be treated with lightness, and should be more particularly inquired into."

In a word, the monistic school of Cheu-tsz' and Chu Hi are in the history of Chinese thought what Kant is in the Western world. They discovered that the Yang and Yin manipulations are what we would call the most abstract algebra of thought or the science of pure forms, embodying the universal and necessary laws of both the objective realm of existence and the subjective realm of man's mentality.

FILIAL PIETY 孝

European and American civilisation has less firm foundations in us as compared with the deep root which the Chinese view of life has struck in the souls of Chinamen. It is reflected in their institutions, in their arts, in the habits of their daily life,¹ in their symbolism, in their language, and above all in their ethics which reflects their views of the relation of Yang to Yin, being in its noblest conception the completest submission of a child to the will of his father, a virtue which is called in Chinese 孝 *Hiao*.²

As an instance of the influence of the Yang and Yin philosophy upon the life of all nations that have ever felt the influence of the Chinese world-view, we state that the name of the greatest Japanese monthly is "The Great Yang"; which is translated by the editors by "The Sun." The flag of the Coreans shows the diagram of the symbol of the primordial source of existence (as it appears in Fig. 13) in blue and red colors, surrounded by the trigrams Ch'ien, Kân, Lî, and Kw'un, "☰ ☷ ☵ ☴."

As an example of the artistic representation of Yang and Yin, we here reproduce a Japanese picture (facing p. 224), which represents a double door of the main entrance in a public building.

The most important field in which the Yang and Yin philosophy exercises its influence is in the domain of ethics. The dualism that still lingers in Chinese thought finds its expression in the Chinese code of morals which always implies an external relation between two, an authoritative master and an obedient servant, the duty of the former being wisdom in government, and of the latter submission. One of the favorite treatises of Chinese literature, the booklet entitled *The Classic of Filial Piety*,³ sets forth the idea that "filial

¹ As a thoroughly reliable description of Chinese life we recommend Prof. Robert K. Douglas's works, *Chinese Stories*, W. Blackwood & Sons, Edinburgh, 1893, and *Society in China*, A. D. Innes & Co., London, 1894.

² The character *Hiao*, 孝, filial piety, shows a child supporting an old man.

³ *Sacred Books of the East*, Vol. III., pp. 447-448. The book was written either by Tsang-tsz', the disciple of Confucius, or by one of Tsang-tsz' 's school.

devotion is the root of virtue." Filial devotion is said to be "the maxim of Heaven, the righteousness of Earth, and the duty of man"

The idea of filial piety is widened into devotion as it applies to the five moral relations that obtain between man and man; viz., between (1) sovereign and subject, (2) parent and child, (3) elder brother and younger, (4) husband and wife, (5) friend and friend.¹

When asked by Tsang whether in the virtue of the sages there was not something higher, Confucius replied :

"Of all (creatures with their different) natures produced by Heaven and Earth, man is the noblest. Of all the actions of man there is none greater than filial piety. In filial piety there is nothing greater than the reverential awe of one's father. In the reverential awe shown to one's father there is nothing greater than the making him the correlate of Heaven."

The higher monistic ethics, which becomes possible only on an advanced plane in the evolution of mankind, unites both the governor and the governed in one person and expects every one to be his own king, priest, and instructor, replacing the external relation by an internal relation. This principle of a monistic ethics was first proclaimed in the history of European civilisation by the reformers of the sixteenth century, who taught self-dependence and claimed the liberty of conscience. Liberty of conscience, self-reliance, the right of free inquiry and free thought abolish personal authority, not for the sake of anarchy, but to replace it by the superpersonal authority of justice, right, and truth.

Filial devotion remains submission, as we read in Chapter XI :

"When constraint is put upon a ruler, that is the disowning of his superiority; when the authority of the sages is disallowed, that is the disowning of (all) law; when filial piety is put aside, that is the disowning of the principle of affection. These (three things) pave the way to anarchy."

Rebels are punished with brutal severity, yet there are frequent revolutions in China; and the Shu King goes so far even as to sanction them, provided they be successful. We read :

¹The fivefold relationship which constitutes the substance of Chinese ethics is supplemented by K'ung Ki's principle that good is the middle way between two extremes—a doctrine, which by Western critics has been censured as "the ethics of mediocrity." K'ung Ki was a grandson of Confucius.

厨子扉二天王圖



"Heaven establishes sovereigns merely for the sake of the people; whom the people desire for sovereign, him will Heaven protect; whom the people dislike as sovereign, him will Heaven reject.

"[The Sovereign's] real way of serving Heaven is to love the people.

"When he fails to love the people Heaven will, for the sake of the people, cast him out."

Thus revolutions are regarded as ordeals in which success or failure signify the decision of heaven.

How the spirit of devotion is carried to the extreme, can be illustrated by many instances of Chinese habits, history, and stories. We quote one tale, which is at once typical and terse, from a popular book called *The Twenty-four Filials*:¹

"In the days of the Han dynasty lived Koh Kū, who was very poor. He had one child three years old; and such was his poverty that his mother usually divided her portion of food with this little one. Koh says to his wife, 'We are so poor that our mother cannot be supported, for the child divides with her the portion of food that belongs to her. Why not bury this child? Another child may be born to us but a mother once gone will never return.' His wife did not venture to object to the proposal; and Koh immediately dug a hole of about three cubits deep, when suddenly he lighted upon a pot of gold, and on the metal read the following inscription: 'Heaven bestows this treasure upon Koh Fū, the dutiful son; the magistrate may not seize it, nor shall the neighbors take it from him.'"²

The neglect of what Western nations would consider as the highest duties is frequently enjoined for the sake of parents; and in agreement with this code of morals, the Chinese Emperor of late concluded to yield to all the demands of the victorious Japanese only that the Empress dowager in Peking should not be obliged to be inconvenienced by a removal of the Imperial Court.

While on this important point our Western ideas of morality are different from those of the Chinese, we ought to consider that our American youths go to the other extreme. They can still learn from the Chinese, whose devotion to old parents is sometimes truly elevating and touching; and we have to add that one of the chief obstacles, although not the only one, to the introduction of Christianity into China are such words of Christ's as these:

二十四孝

² Quoted from Williams's *Middle Kingdom*, Vol. I., p. 539.

"If any man come to me, and hate not his father, and mother, and wife, and children, and brethren, and sisters, yea, and his own life also, he cannot be my disciple."—Luke, xiv, 26.

"I am come to set a man at variance against his father, and the daughter against her mother, and the daughter-in-law against her mother-in-law."—Matth., x, 35.

The dualism of Chinese ethics finds expression in a rigid code of ceremonial forms. Who ever met an educated Chinese gentleman and was not struck by his extraordinary and almost painfully polite demeanor? How much stress is laid upon details in propriety, we can gather from the following injunction of courtesy toward visitors as quoted by Williams, in his *Middle Kingdom*, Vol. I., p. 540, from Chu Hi's "Juvenile Instructor" (*Siao Hioh*):

"Whoever enters with his guests, yields precedence to them at every door; when they reach the innermost one, he begs leave to go in and arrange the seats, and then returns to receive the guests; and after they have repeatedly declined he bows to them and enters. He passes through the right door, they through the left. He ascends the eastern, they the western steps.

"If a guest be of a lower grade, he must approach the steps of the host, while the latter must repeatedly decline this attention; then the guest may return to the western steps, he ascending, both host and guest must mutually yield precedence: then the host must ascend first, and the guests follow. From step to step they must bring their feet together, gradually ascending—those on the east moving the right foot first, those on the west the left."

THE SIGNIFICANCE OF THE 易 YIH.

We ask now, what is the original significance of the Yih King, and, without attempting to decide the problem, present some solutions which have been proposed by various scholars.

The oldest European interpretation of the Kwa comes from the pen of no less an authority than the great Leibnitz. On explaining, in the *Mémoires de l'Académie Royale des sciences* (1703, III., p. 85), the nature and advantage of the binary or dyadic system of numeration, which employs only the symbols 0 and 1, expressing 2 by 10, 3 by 11, 4 by 100, 5 by 101, 6 by 110, 7 by 111, etc., he makes reference to the Kwa of the Yih King, which he calls "cova."¹ He says:

¹ "Cova" is the same as "coua," "v" being equal to "u."

"Ce qu'il y a de surprenant dans ce calcul, c'est que cette arithmétique par 0 et 1 se trouve contenir le mystère des lignes d'un ancien roi et philosophe nommé Fohy, qu'on croit avoir vécu il y a plus de quatre mille ans, et que les Chinois regardent comme le fondateur de leur empire et de leurs sciences. Il y a plusieurs figures linéaires qu'on lui attribue. Elles reviennent toutes à cette arithmétique, mais il suffit de mettre ici la figure de huit Cova comme on l'appelle, qui passe pour fondamentale, et d'y joindre l'explication, qui est manifeste, pourvu qu'on remarque premièrement qu'une ligne entière — signifie l'unité ou 1, et secondement qu'une ligne brisée — — signifie le zéro ou 0.

							
000	001	010	011	100	101	110	111
0	1	10	11	100	101	110	111
0	1	2	3	4	5	6	7

"Les Chinois ont perdu la signification des Cova ou linéations de Fohy, peut être depuis plus d'un millénaire d'années; et ils ont fait des commentaires là-dessus, où ils ont cherché je ne sais quels sens éloignés. De sorte qu'il a fallu que la vraie explication leur vînt maintenant des Européens. Voici comment. Il n'y a guère plus de deux ans que j'envoyai au R. P. Bouvet, Jésuite français célèbre, qui demeure à Pekin, ma manière de compter par 0 et 1, et il n'en fallut pas d'avantage pour le faire reconnaître que c'est la clef de figures de Fohy. Ainsi m'écrivant le 14. Novembre, il m'a envoyé la grande figure de ce prince philosophe qui va à 64, et ne laisse plus lieu de douter de la vérité de notre interprétation, de sorte qu'on peut dire que ce Père a déchiffré l'énigme de Fohy à l'aide de ce que je lui avais communiqué. Et comme ces figures sont peut-être le plus ancien monument de science qui soit au monde, cette restitution de leur sens, après un si grand intervalle de temps, paraîtra d'autant de plus curieuse.

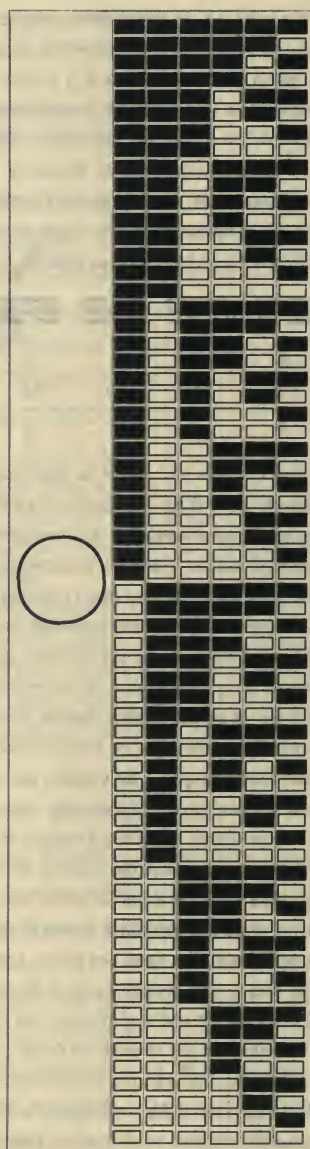
"Le consentement des figures de Fohy et de ma Table des Nombres se fait mieux voire lorsque dans la table on supplée les zéros initiaux, qui paraissent superflus, mais qui servent à mieux marquer la période de la colonne, comme je les y ai supplées en effet avec des petits ronds pour les distinguer des zéros, et cet accord me donne une grande opinion de la profondeur des méditations de Fohy. Car ce qui nous paraît aisé maintenant, ne l'était pas dans ce temps éloigné.

"L'arithmétique binaire ou dyadique est en effet fort aisé aujourd'hui pour peu qu'on y pense, par ce que notre manière de compter y aide beaucoup, dont il semble qu'on retranche seulement le trop. Mais cette arithmétique ordinaire par dix ne paraît pas fort ancienne, au moins les Grecs et les Romains l'ont ignorée, et ont été privés de ses avantages. Il semble que l'Europe en doit l'introduction à Gerbert, depuis Pape sous le nom de Sylvestre II, qui l'a eu des Maures d'Espagne.

"Or comme l'on croit à la Chine que Fohy est encore auteur des caractères Chinois ordinaires, quoique fort altérés par la suite des temps: son essay d'arithmé-

o	o	o	o	o	o	= 0
o	o	o	o	o	I	= 1
o	o	o	o	I	o	= 2
o	o	o	o	I	I	= 3
o	o	o	I	o	o	= 4
o	o	o	I	o	I	= 5
o	o	o	I	I	o	= 6
o	o	o	I	I	I	= 7
o	o	I	o	o	o	= 8
o	o	I	o	o	I	= 9
o	o	I	o	I	o	= 10
o	o	I	o	I	I	= 11
o	o	I	I	o	o	= 12
o	o	I	I	o	I	= 13
o	o	I	I	I	o	= 14
o	o	I	I	I	I	= 15
o	I	o	o	o	o	= 16
o	I	o	o	o	I	= 17
o	I	o	o	I	o	= 18
o	I	o	o	I	I	= 19
o	I	o	I	o	o	= 20
o	I	o	I	o	I	= 21
o	I	o	I	I	o	= 22
o	I	o	I	I	I	= 23
o	I	I	o	o	o	= 24
o	I	I	o	o	I	= 25
o	I	I	o	I	o	= 26
o	I	I	o	I	I	= 27
o	I	I	I	o	o	= 28
o	I	I	I	o	I	= 29
o	I	I	I	I	o	= 30
o	I	I	I	I	I	= 31
I	o	o	o	o	o	= 32
I	o	o	o	o	I	= 33
I	o	o	o	I	o	= 34
I	o	o	o	I	I	= 35
I	o	o	I	o	o	= 36
I	o	o	I	o	I	= 37
I	o	o	I	I	o	= 38
I	o	o	I	I	I	= 39
I	o	I	o	o	o	= 40
I	o	I	o	o	I	= 41
I	o	I	o	I	o	= 42
I	o	I	o	I	I	= 43
I	o	I	I	o	o	= 44
I	o	I	I	o	I	= 45
I	o	I	I	I	o	= 46
I	o	I	I	I	I	= 47
I	I	o	o	o	o	= 48
I	I	o	o	o	I	= 49
I	I	o	o	I	o	= 50
I	I	o	o	I	I	= 51
I	I	o	I	o	o	= 52
I	I	o	I	o	I	= 53
I	I	o	I	I	o	= 54
I	I	o	I	I	I	= 55
I	I	I	o	o	o	= 56
I	I	I	o	o	I	= 57
I	I	I	o	I	o	= 58
I	I	I	o	I	I	= 59
I	I	I	I	o	o	= 60
I	I	I	I	o	I	= 61
I	I	I	I	I	o	= 62
I	I	I	I	I	I	= 63

BINARY SYSTEM OF LEIBNITZ.



CHOW TSE'S DIAGRAM.

It will be of interest to compare Leibnitz's binary numbers with Chow-tsze's design; the similarity among which will appear as soon as o is identified with the black ■ and 1 with the white □ spaces.

tique fait juger qu'il pourrait s'y trouver quelque chose de considérable par rapport aux nombres et aux idées, si l'on pouvait déterrer le fondement de l'écriture Chinoise, d'autant plusqu'on croit à la Chine, qu'il a eu égard aux nombres en l'établissant. Le R. P. Bouvet est fort porté à pousser cette pointe, et très capable d'y réussir en bien de manières. Cependant je ne sais s'il y a jamais eu dans l'écriture Chinoise un avantage rapprochant de celui qui doit être dans une caractéristique que je projette. C'est que tout raisonnement qu'on peut tirer des notions, pourrait être tiré de leurs caractères par une manière de calcul, qui serait une des plus importants moyens d'aides de l'esprit humain."

Prof. Moritz Cantor,¹ disposes of Leibnitz's interpretation of the Kwa because "Mr. Duhalde had proved them to be projective drawings of the knotted cords." He adds that they must, according to Bouvet, be regarded, on account of their names, not as numbers, but as physical symbols, and explains Leibnitz's theory as exclusively due to his philosophical interpretation of the binary system, which was to him an evidence in favor of his conception of a creation from nothing or zero with the sole assistance of One or the unit. But Cantor seems to overlook that in this very respect the ancient Yang and Yin philosophy of the Chinese closely resembles Leibnitz's idea, whether we regard the Kwa as numbers, or as a binary system of such symbols as are still more general and indefinite. The fact of both their presence and their philosophical significance remains the same and cannot be doubted.

The first translation of the 易 Yih is in Latin. It was made by the Jesuit P. Regis with the assistance of some of his colleagues, and edited in two volumes by Julius Mohl.²

Prof. James Legge's translation is based upon the idea that the book in its main parts and originally was intended to be a kind of political testament of King Wen and the Duke of Cheu, enlarging on moral and social questions, but enigmatically written after the manner and fashion of diviners. He therefore tries to bring his mind *en rapport* with the mind of its authors and paraphrases the meaning of the disconnected words and sentences in the sense that he

¹ In his *Mathematische Beiträge zum Kulturleben der Völker*, Halle, 1863, p. 49.

² Y King, *Antiquitissimus Sinarum liber, quem ex latina interpretatione P. Regis aliorumque ex Soc. Jesu P. T., edidit Julius Mohl.* Stuttgartiæ et Tübingæ. 1834.

finds indicated in the text. He encloses his additions in parentheses, saying :

"I hope, however, that I have been able in this way to make the translation intelligible to readers. If, after all, they shall conclude that in what is said on the hexagrams there is often 'much ado about nothing,' it is not the translator who should be deemed accountable for that, but his original."

A peculiar conception of the Yih King has been propounded by P. L. F. Philastre, who lays much stress on the tradition that Fuh-Hi received his first idea of the Kwa by contemplating the starry heavens and believes that he discovered in the Kwa combinations a method of symbolising the astronomical lore of the ancient Chinese. His lucubration embodies translations of the most important Chinese commentaries.¹

Canon McClatchie published a translation of the Yih King in which he ventures to open its mysteries "by applying the key of comparative mythology." I have not seen it and quote only what Professor Legge has to say about it (*Sacred Books of the East*, Vol. XVI, p. xvii):

"Such a key was not necessary and the author by the application of it, has found sundry things to which I have occasionally referred in my notes. They are not pleasant to look at or dwell upon, and happily it has never entered into the minds of Chinese scholars to conceive them."

A. Terrien de Lacouperie² believes that the Yih King is a mere vocabulary containing those word-symbols which the Bak families brought with them as a sacred inheritance of the Elamo-Babylonian civilisation.

P. Angelo Zottoli says of the Yih King in his *Cursus Literaturae Sinicae* :

"A. Terrien de Lacouperie believes that the old Chinese civilisation is an offshoot of the Elamo-Babylonian civilisation in the very stage of development that had been reached a little after the middle of the third millennium B. C., and claims that the hexagrams are the script which the Bak tribes, the oldest civilisers of China, carried with them to the new homes, and the Yih King is originally a dictionary of the ancient word-symbols with their lexicographical explanations, the mean-

¹ *Annales du Musée Guimet*, Vols. VIII. and XXIII.

² *The Oldest Book of the Chinese, the Yi King and Its Authors*. London: D. Nutt, 270 Strand, 1892.

ing of which was later on misunderstood without losing the awe that naturally was attached to the book as embodying the wisdom of the sages of yore."

"The book consists of the figures of Fuh Hi, of the divinations of King Wen, of the symbols of the Duke of Cheu, and the commentaries of Confucius. From the permutations which the two elements in the composition of the hexagrams undergo it is called Yih (the permutator), or Yih King, the Book of Permutations. What, then, is this famous Yih King? It is, briefly, this. From the continuous or bisected quality of the lines, their position either at the bottom or in the middle or topmost, their mutual relation as being opposed and separated, or coming together, the body or form of the trigrams themselves; further, from the symbol or image of the trigrams, from the quality or virtue of the trigrams, sometimes from the difference of one hexagram as compared to another, a certain picture is developed and a certain idea is deduced containing something like an oracle that can be consulted by drawing lots, in order to obtain some warning fit for guidance in life or to solve some doubt. Such is the book according to the explanations of Confucius as handed down in the schools. Therefore, you must expect neither anything sublime or mysterious, nor anything unseemly or vile. I see in it rather a subtle play for eliciting moral and political instructions, such as can be found in the Chinese classics, obtrusive, plain, and natural. Since this book, as a reader of the original text will understand, has been employed for fortune telling, one expects to gain by it the highest happiness of life, mysterious communication with spirits and occult knowledge of future events. Therefore, the book appears as a magic revelation, as a perfect light, as throughout spiritual and conformable to the life of man. Hence the praises attributed to it by Confucius, although quite exaggerated, will be seen specially added in the Appendix of the book, if it is true at all as the common opinion goes, that he himself is the author of the Appendix."¹

Ch. de Harlez, the originator of the idea that the nature of the Yih King is lexicological, does not accept Lacouperie's theory of an Elamo-Babylonian origin of the Yih King. He says in the preface to his French translation of the Yih²:

"Notre système . . . nous fait voir dans le Yih un recueil mi-lexicologique, mi-philosophique de termes et de sentences, plein de raison et de sagesse."—P. 11.

There remains one more hypothesis on the nature of the Yih King which is by Dr. Heinrich Riedel, of Brooklyn, N. Y. He has given me much assistance in my own Chinese studies and I am inclined to believe that he has something to say on the subject that is

¹ Translated from the Latin. The original is quoted by Legge in his Preface to the *Yih King*, p. xviii.

² Published in 1889 by F. Hayer, Bruxelles, rue de Louvain, 108.

worth hearing. Since his observations have never been published, I deem it advisable, for the sake of sinology, to present some chips from his workshop.

Dr. Riedel regards the Yih as a calendar of the lunar year, being what the title of Cheu-tsz' 's book on the Yih indicated, a *T'ung Shu*, "a universal book," or "almanac," embodying everything in the domain of science, religion, ethics, and even sport that appeared of interest. *T'ung Shu* means "calendar," and $6 \times 64 = 384$ (the number of strokes in the hexagrams) is the number of days of the intercalary year. As to the hexagrams, Dr. Riedel insists that "the specific order of the sixty-four hexagrams which is carefully preserved and sacredly guarded by devices that remind us of the Massoretic precautions taken in regard to the Hebrew texts of the Bible and which has yet received little if any attention, is the soul and substance of the Yih King," and trusts to be able to prove that the circular device of hexagrams including the square represents "the problem of squaring the circle." Here are, in a condensed form, some points of his theory:

There is in Chinese authors a frequent substitution of symbols by homonyms; as Gabelentz says: "The ancient authors either through mistake or in emergency, or by sheer whim, used to replace the character of a word by another one which probably in their age had the same or a very similar sound." (*Gr. Ch. Gr.* p. 100.) And this must be expected to have taken place in the Yih King rather more freely than in other books. Now take the first sentence of the Yih King and replace it by homonyms as follows:

乾元亨利貞 見圓行理正

Both lines read nearly alike: "K'ien yuen häng li ching;" but the former means "K'ien, origin (and) progress determined by advantageousness," while the latter means "See the circle's path rectified by reason."

The aphorism belonging to the first (viz. the lowest) Yang line of the first Kwa, which reads "Ts'ien lung wuh, yung," Dr. Riedel

translates: "A hidden dragon through negation is action," which is meant to set forth the mathematical and logical powers of naught (o).

Legge is unable to bring sense into a passage in which robbery is declared to teach ethics (*Sacred Books of the East*, III., p. 203, § 48). The paragraph, however, becomes clear when we adopt Dr. Riedel's proposition to regard robbery as a game like chess and translate it by "latrunculi" or robbery-game. Burden-bearers, i.e. peasants or laborers, should be translated by "pawns." Other allusions that occur in the passage, such as "false moves," "leaving exposed," "attacking," "captured," remind us of our own chess-board terms. In addition, we meet in the Yih *passim* with generals, the tsz', i. e., sages or advisers, horses, carriages, and elephants.¹

Legge translates the aphorism of the second Yang line of the second kwa thus :

"(The second line divided) [shows the attribute of] being straight, square, and great. (Its operation) without repeated efforts will be in every respect advantageous."

Dr. Riedel proposes a more literal translation :

"Rectify square greatly (viz. ever so much), not continuously employing naught, no gain."

The Yang and Yin lines are designated by *kiu* 九 and *luh* 六 two characters which ordinarily mean nine and six. Dr. Riedel claims with great plausibility, that they are employed to designate diameter and radius. *Kiu* means not only "nine," but also "to go to the end of; to go through; or, to bring together." It is a homonym with 𠂇, its inversion,² which means "to take hold of; to join; to connect." Further, *luh* means "six," and in analogy with 二 'rh, which means "two" and "to divide into two," *luh* means also "to divide into sixes" and then sextant, the sixth part of a circle or the radius which is equal to the chord of a sextant. This makes it probable that *kiu* in the Yih King means diameter-line; and *luh* radius line, which again are identified with the full line of Yang and the broken line of Yin.

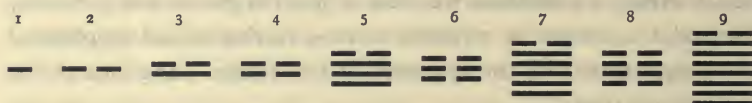
¹ On the chess of the Chinese see Williams's *Middle Kingdom*, I., p. 827.

² 𠂇 *chiu*, "to take hold of," represents a creeping plant twining over a wall.

A passage quoted from K'ung Ngan Tsz' Quoh reads :

"The spirit tortoise carried a writing and methodically arranged divisions. In both respects it had *the digits up to nine*."

Comparing this with a passage in the Book of Three Characters¹ which declares that the five elements "have their origin in numbers," Dr. Riedel deduces from observations made on the carapace of a half-grown *Chrysemys picta*,² which on account of its abnormal number of inner and outer plates a Chinaman would class as a shan kwei, or spirit tortoise, the following writing of the nine digits as a hypothetical reconstruction of the Loh Shu in its substance :



The sum of the Kiu lines is 16, of the Luh lines 29.

The plates on the back of the tortoise yield the same numbers in the same proportion. There are sixteen large inner plates, while there are twenty-three small outer plates, and in addition we have three pairs of small ones that appear to be superimposed upon the three vertebral plates in the centre. The symbols of the five elements, as written on p. 208, yield sixteen long and twenty-nine short lines.

Now, by means of the same distribution of whole and broken lines amongst the nine digits, Dr. Riedel claims to have constructed "an anagram of the number π in one hundred and twenty-three decimal places, exhibiting the sixty-four Yih kwa in their specific order, placed in rows of eight each, from below upwards." The use of an anagram for the purpose of laying down a scientific truth at the time inaccessible, is by no means a device unheard of in the history of science; for in comparatively recent times such men as Roger Bacon, Galileo, and Huygens have done the same thing.

The spiritual tortoise accordingly is a *lusus naturae* which ap-

¹ 三字經 An English translation of this booklet is published in *The Open Court*, No. 412. The passage quoted above is characters 199-204.

² See Fig. 10 on p. 207.

pealed to the mathematical mind of the Chinese and caused them to see in it a spiritual being.

If Dr. Riedel's theory is not the restoration of the ancient Chinese conception, we may rest assured that it was some quite analogous scheme.

Dr. Riedel, in further attempts at proving the presence of the number π in the order of the Kwa of the Yih King, quotes from *Hi tsz'* (App. iii, 1, § 70) the sentence: "The Yih contains the great extreme," and says, "Now as the great extreme which is symbolised by a circle is not mentioned at all, and as we have in the Yih King proper only the mutations of Yang and Yin, the Luh and Kiu, the two symbols (Liang $\hat{I}$), I conclude that they, if anything, must contain the number by which to calculate the circle" (i. e., the symbol of the great extreme). In addition to this argument, Dr. Riedel quotes the passage *Yih Nih Shu Ye*, i. e., "the mutations (are) a refractory number," "refractory number" being defined in *Shwoh Kwa* (App. V. 2) by "making acquainted with the future," which is the opposite to a number that has reference to the past, and is consummated or "compliant." "Accordingly," says Dr. Riedel, "a refractory number can, in the adduced passage, mean only what we call an irrational number."

In the beginning of the same Appendix we read: "The holy men of yore who composed the Yih, concealed their help in spiritual light and thus gave life to the milfoil stalks. They triangulated¹ the heaven, made twofold the earth, and relied upon calculation." All commentators and interpreters agree that in this sentence heaven means the circle, and earth the square. Dr. Riedel suggests that "making twofold the earth (viz., the square) indicates the primitive method of approximating π by circumscribed and inscribed squares."

The aphorism of the fourth hexagram declares:

"Inexperienced one, proceed. We do not seek the youthful and inexperienced. The youthful and inexperienced shall seek us. In its first (elements) divination is propounded. Further details (literally, the second and third) would be tedious. Tedious rules are not propounded."

¹The ancient character for the verb "to triangulate" contains three triangles. Compare the English word "trigonometry."

As to the original meaning of "divination" in the minds of the Chinese, Dr. Riedel adduces from an English-Chinese dictionary the explanatory character *swan*, which denotes "the Chinese abacus," "to cipher," "a calculation," which goes far to prove that the fundamental meaning of "divination" is closely connected with mathematical, arithmetical, and logical determination.

In addition to all this it is, at least, a strange coincidence that the name of the dynasty *Cheu*, 周 after which the present book of Yih is called, means "periphery, curve, enclosure." The verb *cheu* is translated by Williams, "to make a circuit; to environ."

It cannot be my purpose to enter further into Dr. Riedel's arguments, not only because an elaborate proof must, in the very nature of things, be very complicated, but also because I am not sufficiently acquainted with all the details of his further evidence. Dr. Riedel's proposition is, to say the least, not less probable than any one of the other theories of the Yih King that have been advanced. I have devoted more space to it because it is as yet unknown, and, being very striking and ingenious, it is worthy of a careful consideration. Many of his observations which I have inquired into as carefully as I could, with my still limited knowledge of the Chinese language, appear to me correct: but I have not as yet been persuaded to adopt his main theories, that the Yih is a calendar and that a portion of it is devoted to the problem of squaring the circle.

天 AND SHANG TI 上帝 THE BELIEF IN A PERSONAL GOD.

At first sight there does not seem to be much room in the Yang and Yin philosophy for a personal God. Nevertheless, the Chinese believe in 上帝 the Lord on High, who is the sole ruler of the universe and the sole God above all the mythological deities.

The divine power to which men look up as to their authority of conduct is commonly designated with the impersonal term 天 T'ien,¹ i. e., Heaven, which may be translated by Godhood or Deity.

² 天 T'ien consists of 大 "great" and 一 "one."

If conceived as a personal being T'ien is called Shang Ti, i. e. the High Sovereign, or the Lord on High.

The worship of Shang Ti must be very old, for we read that after a severe drought Ching Tang, the founder of the Shang dynasty, which began 1766 B. C., publicly paid religious worship to Shang Ti, confessing his offences, which were six. He had scarcely finished his confession when the rain fell in torrents. We must add that on this occasion the worship of Shang Ti is not related as an innovation, but as a means of deliverance that naturally suggested itself to a good ruler.¹

In the very oldest documents of the Shu King the term "Heaven" is used as is our deity, implying even the conception of a personal being. Thus we read in the Counsels of K'ao-Yâo :

"The work [i. e., the bringing to an end] is Heaven's; but men must act for it."²

"From Heaven are the relationships with their several duties. From Heaven are the [social] distinctions with their several ceremonies.

"Heaven punishes the guilty.

"Heaven hears and sees as our people hear and see. Heaven brightly approves and displays its terrors as our people brightly approve and overawe. Such connexion is between the upper and lower (worlds)."—*Sacred Books of the East*, III., pp. 55-56.

Quotations like these can be multiplied by the thousands. We have purposely limited them to the most ancient documents in the Shu King in order to prove that the idea of a supreme personal deity is not of modern date. At present the worship of Shang Ti is regarded as so holy that the emperor, as the High Priest of the nation, is alone permitted to perform the ceremony.

Peking, the capital of China consists of three cities: the Tartar city to the North, the Forbidden city with the imperial palaces and parks lying within the Tartar city, and the Chinese city to the South. In the southern part of the Chinese city is a park of about a square mile containing the Temple of Heaven and the Altar³ of Heaven,

¹ See Williams's *The Middle Kingdom*, II., p. 154.

² Or better: "Consummation is Heaven's, but men must work for it."

³ We retain this traditional translation "altar," although it is misleading since it suggests the erroneous idea that it must be an altar such as we see in Catholic churches or as it was used by the ancient Greeks.

which are to the Chinese the most sacred spots on earth. The Temple of Heaven (or more correctly, "the Altar of praying for grain") is a triple marble terrace, twenty-seven feet in height, surrounded with marble balustrades and crowned with a temple which rises to the height of ninety-nine feet. The three terraces and the temple are circular. The symmetry of the proportions renders it most beautiful; its dome imitates in shape and color the vault of heaven, and as the round windows are shaded by blinds of blue glass-rods strung together, the entering sun casts an azure light upon the rich carvings and paintings in the inside. The same park in which the Temple of Heaven stands, contains the Altar of Heaven, which is enclosed by an outer square wall and an inner circular wall; and it is here that the emperors of China at the time of our Christmas have been in the habit, from time immemorial, of worshipping 上帝 Shang Ti, "the Lord on High," or as the Emperor Kanghi expressed himself: "the true God." The Altar of Heaven (a picture of which forms the frontispiece to the first volume of Williams's *Middle Kingdom*) is described by Williams as follows¹:

"It is a beautiful triple circular terrace of white marble, whose base is 210, middle stage 150, and top 90 feet in width, each terrace encompassed by a richly carved balustrade. A curious symbolism of the number three and its multiples may be noticed in the measurements of this pile. The uppermost terrace, whose height above the ground is about eighteen feet, is paved with marble slabs, forming nine concentric circles—the inner of nine stones inclosing a central piece, and around this each receding layer consisting of a successive multiple of nine until the square of nine (a favorite number of Chinese philosophy) is reached in the outermost row. It is upon the single round stone in the centre of the upper plateau that the Emperor kneels when worshipping Heaven and his ancestors at the winter solstice."

This round stone, we must remember, is the symbol of the T'ai Kih, ○, the ultimate ground of being. Williams continues:

"Four flights of nine steps each lead from this elevation to the next lower stage, where are placed tablets to the spirits of the sun, the moon, the stars, and the Year God. On the ground at the end of the four stairways stand vessels of bronze in which are placed the bundles of cloth and sundry animals constituting a part of the sacrificial offerings. But of vastly greater importance than these in the matter of

¹ See Williams's *Middle Kingdom*, I., 76-77, and *The Dragon, Image, and Demon*, by Du Bose, New York, 1887 (pp. 57-64).

burnt-offering is the great furnace, nine feet high, faced with green porcelain, and ascended on three of its sides by porcelain staircases. In this receptacle, erected some hundred feet to the southeast of the altar, is consumed a burnt-offering of a bullock—entire and without blemish—at the yearly ceremony. The slaughter-house of the sacrificial bullock stands east of the North Altar, at the end of an elaborate winding passage, or cloister of seventy-two compartments, each ten feet in length."

Such is the religious and popular conception of Shang Tî, which is as deeply rooted in the Chinese mind, and perhaps more deeply than is the God-idea in the West. But just as Western philosophers translate the God-idea of religion into a philosophical principle, (I mention Hegel's Absolute, Schopenhauer's Will, Fichte's Moral World-Order, Spinoza's definition of Substance, etc.,) so the educated Chinese speak of Lao-tsz' 's Tao or World-Logos, of Cheu Tsz' 's T'ai Kih or the ultimate ground of existence, and of Chu Hi's Li or immaterial principle. Chu Hi touches upon the problem of the personality of God in his expositions on the immaterial principle and primary matter. He says after quoting three passages from the classics in which the terms Shang Ti and T'ien (the Lord on High and Heaven) imply the idea of a personal God :

"All these and such like expressions, do they imply that above the azure sky there is a Lord and Ruler who acts thus, or is it still true that heaven has no mind, and men only carry out their reasonings in this style? I reply, these three things are but [expressions of] one idea; it is that the immaterial principle of [the cosmic] order is such."

This seems to imply that his conception of the k'î implies personality; but he adds :

"The primary matter, in its evolutions hitherto, after one season of fulness has experienced one of decay, and after a period of decline, it again flourishes; just as if things were going on in a circle. There never was a decay without a revival."—*Chinese Repository*, Vol. XIII., p. 555.

There is an extensive literature on the question; for some Christian missionaries have objected to the translation of Shang Ti by God and God by Shang Ti, proposing other words in its place.¹

¹ See *The Chinese Repository*, Vol. XVII., pp. 17-53, 57-89 ("Essay on the Term for Deity," by William J. Boone, Bishop of the Protestant Episcopal Church); *ib.* pp. 105-133, 161-187, 209-242, 265-310, 321-354 ("Chinese Term for Deity,"

The controversy began with the Roman Catholic missions. The Jesuit Ricci, an unusual missionary genius, who rendered the Chinese government so many valuable services that he commanded the Emperor's highest respect and unbounded confidence, had drawn up rules for his Christian converts in which he permitted certain Chinese rites, such as honoring the memory of Confucius and of ancestors, justifying these acts by an explanation of their purely secular significance. Ricci at the same time translated, as a matter of course, the word "God" with Shang Tî, and his methods were silently approved in Rome.

Morales, a Spanish Dominican, however, jealous of the great success of his Jesuit brethren, denounced Ricci for pandering to idolatry. The propaganda condemned Ricci's methods as sinful, and Pope Innocence confirmed the sentence in 1645. The Jesuits remonstrated and succeeded. Pope Alexander VI. issued another decree, in which, without directly revoking his predecessor's decision, he sided with Ricci's policy,¹ in agreement with which, in 1665, the Jesuits drew up forty-two articles. The Dominicans did not let things rest here; Navarette, one of their order, renewed the old denunciations, and Bishop Maigrot, an apostolic vicar living in China, issued a mandate in which he declared that "T'ien" signified nothing more than "the material heaven," and that the Chinese customs and rites were idolatrous. The Jesuits applied to the Emperor of China for an authentic explanation of the significance of the words for God and of the Chinese rites, whereupon Kanghi the Emperor declared (in 1700) that T'ien meant the true God, and the ceremonies of China were political.

But the efforts of the Jesuits to influence the Pope failed; Pope Clement XI. confirmed the mandate of Bishop Maigrot in a bull (published in 1703) in which the words T'ien and Shang Tî were

by Dr. W. H. Medhurst); *ib.* pp. 357-360 ("A Few Plain Questions by a Brother Missionary"); and *ib.* pp. 489 et seq., 545 et seq., and 601 et seq. ("Dr. Medhurst's Reply to Bishop Boone").

¹ Ricci's "Divine Law" is published in an unabridged form in Kircher's *China Illustrata*, 1667.

rejected as pagan, while the expression T'ien Chu, i. e. Lord of Heaven, was approved of.

From these days the rapid decline of the Roman Catholic missions in China begins. Ricci's doctrines were not countenanced in Rome, and Maigrot's followers were persecuted by the Chinese government.

Among Protestant missionaries the Rev. Dr. Boone proposes to translate God by Shin = Spirit,¹ and takes the field against all those who use the terms Shang Tî or T'ien; but he is opposed by the majority of his colleagues, Dr. Medhurst, Sir George Staunton, Dr. Bowring, Mr. Dotty, and Professor Legge.

Prof. James Legge has written a learned discussion on the subject²; adducing innumerable passages in corroboration of his views. In his introduction to the Shu King he quotes Tâi T'ung's dictionary in defining the meaning of the word "Tî." Tâi T'ung says:

"Tî is the honorable designation of lordship and rule, therefore Heaven is called Shang Tî; the Elementary Powers are called the five Tî; and the Son of Heaven—that is, the Sovereign—is called Tî."

Professor Legge adds:

"Here then is the name Heaven, by which the idea of Supreme Power in the absolute is vaguely expressed; and when the Chinese would speak of it by a personal name, they use the terms Tî and Shang Tî;—saying, I believe, what our early fathers did, when they began to use the word God.

"Tî is the name which has been employed in China for this concept for fully five thousand years. Our word God fits naturally into every passage where the character occurs in the old Chinese Classics. It never became with the people a proper name like the Zeus of the Greeks. I can no more translate Tî or Shang Tî by any other word but God than I can translate 人 by anything else but man."

The general belief that the Chinese are obstinately opposed to Christianity and Christian ethics is a great error. The Chinese have a contempt only for the dogmatism that is commonly preached to them as Christianity. In spite of all the missionary efforts of Christians, the Chinese know of Christianity as little as, or even less than, Western nations know of Confucius, Lao-tsz', and Buddha. How

deeply the simple story of Jesus and his preachings of love and charity can impress the Chinese mind, if it is told in a truly Chinese way, without identifying Christianity with beef-eating or the opium trade, can be learned from the fact that the Tai Ping revolution, which shook the throne of the Celestial Empire, was conducted by native Christians who could no longer stand the persecutions of the Confucian authorities. Hung Sew Tseuen, a simple schoolmaster, who in his youth had seen visions entrusting him with a religious mission, read the Gospel, and, being impressed with its moral truths, baptised himself and began to preach Christ's ethics of good-will toward all. He was discharged and persecuted because he refused to pay the customary worship to Confucius; but he continued to preach until he saw himself at the head of an army that might have overpowered the government of the Chinese Empire. While this rebellion raged in China, the English did not even know that the rebels were Christians. So little did they know of the affairs of the interior of China!

Hung Sew Tseuen is described in *The Chinese and General Missionary Gleaner* as "of ordinary appearance, about five feet four or five inches high, well built, round faced, regular featured, rather handsome, about middle age, and gentlemanly in his manners."

Thomas Taylor Meadows, Chinese interpreter in H. M. Civil Service, has published a detailed account of the Tai Ping revolution¹ in his book, *The Chinese and Their Rebellions*, London, 1856. He says on page 193:

"My knowledge of the Chinese mind, joined to the dejected admissions that Protestant missionaries of many years' standing occasionally made of the fruitlessness of their labors, had convinced me that Christianity, as hardened into our sectarian creeds, could not possibly find converts among the Chinese, except here and there perhaps an isolated individual. Consequently when it was once or twice rumored that the large body of men who were setting Imperial armies at defiance 'were Christians,' I refused to give the rumor credence. It did not occur to me that the Chinese convert, through some tracts of a Chinese convert, might either fail to see, or (if he saw them), might spontaneously eliminate the dogmas and congealed forms of merely sectarian Christianity, and then by preaching simply the great religious truth of One God, and the pure morality of Christ's Sermon on the

¹ See also Rev. Th. Hamberg's article in the *N. Am. Review*, Vol. LXXIX., p. 158.

Mount, obtain numbers of followers among people disgusted with the idolatry and the immorality that they and those around them were engulfed in. As we have seen above, this was actually the case with Hung Sew Tseuen."

LAO-TSZ' 老子 AND CONFUCIUS 孔子

The Yang and Yin conception of the ancient Chinese has exercised a dominating influence upon all Chinese thinkers¹, with the sole exception of Lao-tsz', who lived at the end of the sixth century before Christ. Lao-tsz's 道德經 *Tao-Teh-King* ("the Classic on Reason and Virtue," that wonderful booklet on 道 *Tao*, i. e., the Path or Method, the Word or Reason, the Logos, that was in the beginning and on 德 *Teh* virtue,² propounding an ethics that repudiates all self-assertion, closely resembling the injunctions of both Buddha and Christ), stands alone in the whole literature of China. It is not less monistic than the doctrines of the T'ai Kih, but less rigid, less *a priori*, less self-sufficient. It would have served the Chinese better than the Confucian philosophy.

Williams defines 道 *tao*, as follows:

"A road, path, or way; . . . a principle, a doctrine, that which the mind approves; used in the classics in the sense of the right path in which one ought to go either in ruling or observing rules; rectitude or right reason; in early times, up to 500 A. D., the Buddhists called themselves tao-yan, i. e., men (seeking for) reason [enlightenment], or intelligent men, denoting thereby their aspiration after 'pu-ti (Sanskrit *bodhi*), intelligence; the Reason or Logos of the rationalists" [the so-called Taoists].³ . . . [As a verb *tao* means] "to lead, to direct, to go in a designated path; to speak, to converse."

¹On the literature of China, see Schott's "Entwurf einer Beschreibung der chinesischen Litteratur, gelesen in der Akademie der Wissenschaften," 1850, and published in the *Philosophisch-Historische Klasse* in 1853, pp. 293-418.

²德 is a combination of the three radicals "to go," "straight," and "heart."

³The Taoists who regard themselves as followers of Lao-tsz' have distorted their master's doctrines beyond recognition. The Tao religion is best characterised in "The Book of Rewards and Punishments," translated in full only into French by Stanislaus Julien under the title *Le livre des récompenses et des peines*. Paris, 1835. See also *Confucianism and Taoism*, by Prof. Robert K. Douglas.

The character 道 *tao*, is composed of "to go" and "head," denoting "marching at the head."

We are told that Confucius visited Lao-Tsz', who, being by half a century his senior, must then have been about eighty years old. While Confucius propounded the maxims of justice, the old philosopher urged the principle of good-will toward every one, saying :¹

"Recompense injury with kindness."

Confucius, unable to fathom Lao-tsz' 's meaning, replied :

"With what then will you recompense kindness? Recompense injury with justice (punishment), and recompense kindness with kindness."

Lao-tsz' propounds the gist of his ethics in § 49 of the Tao-Teh-King, where he says :

"The good I would meet with goodness. The not-good I would also meet with goodness ; for the *teh*² (virtue) is good (throughout). The faithful I would meet with faith. The not-faithful I would also meet with faith ; (for) the *teh* (virtue) is good (throughout)."

Lao-tsz' objected to the very basis of Confucian morality. Confucius expected to make people good by teaching them propriety; if they were but respectful to parents and superiors, if they brought sacrifices to the shrines of their ancestors, and observed the appropriate rules and ceremonies, mankind would become moral. Lao-tsz' exhibited an undisguised contempt for externalities and ancestor-worship. He demanded purity of heart, emptiness of desire, and a surrender of all self-display, in imitation of the great Tao (Reason), which serves all without seeking its own.³

Sz' Ma Ts'ien,⁴ who lived about 163-85 B. C., reports on the authority of Chwang-tsz' (about 330 B. C.) that Confucius in his interview with Lao-tsz', showed himself overawed by reverence for the wisdom of the ancient traditions. Lao-tsz' said :

¹ John Chalmer's *The Speculations of the Old Philosopher, Lau-tsz'*, p. xviii.

² 德

³ See also Douglas's *Confucianism and Taoism*, pp. 176 et seq.

⁴ The original Chinese text with a German translation is published by Gabelentz in his *Anfangsgründe der Chinesischen Grammatik*, p. III et seq.

"Lord, of whom you speak, the men and their bones, I suppose, have altogether rotted away. Their words only are still extant. Moreover, if a sage find his time, he rises; if he does not find his time, he wanders about like a P'ung plant [which is described by the commentators to be a plant, growing on the sand and easily carried about by the wind]. I have heard, a wise merchant hides [his treasures] deeply, as if [his house or safe] were empty. A sage of perfect virtue gives himself the appearance as though [he were] simple-minded 愚 *yü*.¹

"Give up your proud spirit, your many wishes, your external appearance with your exaggerated plans. These all are of no advantage to the sage's person. This is what I have to communicate to you, sir; that is all."

Sz'-Ma-Ts'ien continues:

"Confucius went; and he said to his disciples: 'Of the birds I know that they can fly, of the fishes I know that they can swim, of the beasts I know that they can run. For the running, one makes nooses; for the swimming, one makes nets; for the flying, one makes arrows. As to the dragon, I do not know how he rides upon wind and clouds up to heaven. To-day I saw Lao-tsz'. Is he perhaps like the dragon?'"

Confucius was more congenial to his countrymen than Lao-tsz', for he was more typically Chinese. Although his life had been an unbroken chain of disappointments, Confucius succeeded after his death in becoming the moral teacher of the Chinese people. His agnostic attitude in metaphysics and religion which neither affirms nor denies the existence of a beyond, of God, or gods, and of ghosts, but avoids investigating the matter, his unbounded reverence for the past, his respect for scholarship and book-learning, his ethics of traditionalism, which implies an extreme conservatism, his exaggeration of propriety, his ceremonialism, and above all his ideal of submission to authority have more and more become national traits of the Chinese nation.

What a pity that the weakness of China is an exaggerated virtue; it is reverence run mad—a virtue in which America is as much deficient as China is in excess.

It was characteristic of a typical Chinaman like Confucius that

¹ Gabelentz translates 愚 *yü* by "dumm." The character contains the symbols denoting "monkey" and "heart or mind." See Williams's *Syllabic Dictionary of the Chinese Language*, p. 1120.

he should have admired the Yih King solely on account of its age, because it came down to him from the sages of yore. He said :

"Should a few more years be granted to me, I shall have applied fifty to studying the Yih and thereby could be free from erring greatly."—*Lün Yü*, VII., 16.¹

We know much more about Confucius than about any other Chinese philosopher, emperor, or saint, but it appears that he was more of a moral teacher than a philosopher or mathematician, and it is probable that the Yih King was to him a book with seven seals, the unintelligibility of which fascinated him.

Having impressed upon the nation his personality, Confucius lived on in the souls of his countrymen ; and, following their master's injunction, the Chinese continued to study the Yih King without finding the solution of its problems. Instead of avoiding grave mistakes, they committed the gravest one : they relied upon traditional authority and ceased to be self-dependent. Instead of deciphering the eternal revelation of truth that surrounds us in the living book of nature and of our individual experiences, they pondered over the secret meanings of the holy Yih King ; and even to-day there are many among them who believe that the Yih King contains all the wisdom, physical, moral, and metaphysical, that can be conceived by any of the sages of the world.²

The mistake of the Chinese is natural and perhaps excusable, for it is founded upon a profound, although misunderstood and misapplied, reverence for the great sages who laid the cornerstone of their civilisation. We, as outsiders, can easily appreciate the merits and reject the errors of the fundamental principles of Chinese thought ; but not all of us are conscious of the fact that in many respects we too suffer from an exaggerated reverence for traditionalism.

¹ Such is the translation according to Dr. Riedel, which, after a comparison with the original, I find, so far as I can judge, as literal as possible. Professor Legge translates : "If some years were added to my life, I would give fifty to," etc.

² The claim that the Yih contains all science should be interpreted in the same sense as we might declare that logic contains all possible rules of thought, and the multiplication-table is the essence of all possible numerical relations.

CONCLUSION.

Whatever may be the solution of the mystery of the Yih King, it is almost certain that the Chinese themselves do not understand it. Thus in spite of the simplicity of their philosophy of permutations, as we may briefly call the theory of constructing a world-conception from Yang and Yin elements, all their thinking, planning, and yearning is dimmed by mysticism; and the vain hope of divination fills their minds with superstitious beliefs which makes them, on the one hand, slavishly submissive to the various evils of life, and, on the other hand, self-satisfied in the belief that their sages alone are in possession of the philosophers' stone. All this renders the Chinese unfit to grasp the significance of reality, and abandons them almost hopelessly to the mercy of their own barbarous institutions, such as their antiquated penal laws and prison practices, extortionate taxation, and the arbitrary government system, to which they patiently submit.

Patience is a virtue which is much admired in China and highly praised in prose and verse, as the basis of self-control, domestic peace, and good government. We read in the famous Pih Jin Ko, the "Ode on Universal Patience":¹

"This song of patience universal,
Of universal patience sings.

Can one be patient, summer is not hot;
Can one be patient, winter is not cold.

Can one be patient, poverty is yet happy;
Can one be patient, long life may yet be protracted.

With impatience, little evils change to great;
With impatience, a good nature at length becomes wolfish.

Kow Tseñ tasted gall, and patiently waited for revenge;
Tan of Yen, from want of moderation, in the end was lost and perished.

Sze Tih, when spit upon in the face, patiently let it dry;
Tih Chaou, for want of patience, was a very dunce.

¹ See *Chinese Repository*, Vol. IX., p. 48, where the original Chinese is published together with an English translation.

The benevolent endure what other men can hardly bear ;
The wise submit to what others never would endure.

To repress anger and restrain the passions is the square of patience ;
To wear the petticoat,¹ and be humble, is the rule of patience.

Patience is the watchword for laying the foundation of perfection ;
Patience is the watchword for forming the root of virtue.

Patience is the watchword to succeed among barbarians and savages ;
Patience is the watchword to rule the violent and obstinate.

Can one bear toil and labor, one will have a superabundance :
Can one refrain from wild excess, one will be free from violent disease.

Can one forbear tattle, one will avoid slander ;
Can one forbear strife and contention, one dissipates hatred and resentment.

Can one submit to abuse and raillery, one shows his caliber ;
Can one bend to thorough study, one accumulates learning.

Once patient, all blessings come in company ;
Once patient, every woe is burnt to ashes."

The Chinese government, and with it the Chinese nation, seem to be at present in a pitiable plight ; and, indeed, their empire is like a Colossus of brass on clay feet.

Nevertheless, there is at the foundation of the Chinese civilisation and of the Chinese national character a nucleus of moral worth and intellectual capabilities which may come to the front again. To conquer China in war may be easy enough, but to compete with her children in the industrial pursuits of peace may prove impossible. The conqueror often succumbs to the less noisy but more powerful virtues of the conquered. Thus Greece overcame Rome and the Saxons Anglicised the Normans. When the walls break down which separate China from the rest of the world so as to give the Chinese a chance of learning from us all they can, it is very doubtful what the result of a free competition with the Chinese will be. Their imperturbable patience, their endurance, their steadfast character, their pious reverence, their respect for learning,

¹ This phrase means "to be submissive to authority, as a wife ought to be to her husband," being the reverse of a well-known expression in English slang.

should not be underrated. If these virtues are but turned in the right direction and tempered by that breadth of mind which is indispensable for progress, the Chinese will soon recover; and nothing is more apt to produce a national rebirth than hard times, trials, and humiliations.

China is offered in her recent misfortunes the chance of a spiritual rebirth. Should she avail herself of this opportunity, she would, with her four hundred millions of inhabitants and her untold virgin resources, at once take a prominent rank among the nations of the earth; and her civilisation might become strong enough to influence and modify our own.

EDITOR.

GERMINAL SELECTION.¹

NUMEROUS and varied are the objections that have been advanced against the theory of selection since it was first enunciated by Darwin and Wallace—from the unreasoning strictures of Richard Owen down through the acute and thoughtful counter-arguments of Albert Wigand and Nägeli to the opposition of our own day, which contends that selection cannot create but only reject, and which fails to see that precisely through this rejection its creative efficacy is asserted. The champions of this view are for discovering the motive forces of evolution in the *laws* that govern organisms—as if the norm according to which an event happens were the event itself, as if the rails which determine the direction of a train could supplant the locomotive. Of course, from every form of life there proceeds only a definite, though extremely large, number of tracks, *the possible variations*, whilst between them lie stretches without tracks, *the impossible variations*, on which locomotion is impossible. But the actual travelling of a track is not performed by the track but by the locomotive, and on the other hand, the choice of a track, the decision whether the destination of the train shall be Berlin or Paris is not made by the locomotive, the cause of the variation, but by the driver of the locomotive, who directs the engine to the right track. In the theory of selection the engine-driver is represented by utility, for with utility rests the decision as to what particular variational track shall be travelled. The cogency, the irresistible cogency, as I take it, of the principle of selection is pre-

¹ An address delivered before the International Congress of Zoölogists at Leyden, Sept. 16, 1895. (Unpublished.) Translated from Professor Weismann's manuscript by T. J. McCormack.

cisely its capacity of explaining why fit structures always arise, and that certainly is the great problem of life. Not the fact of change, but the *manner* of the change, whereby all things are maintained capable of life and existence, is the pressing question.

It is, therefore, a very remarkable fact, and one deserving of consideration, that to-day, after science has been in possession of this principle for something over thirty years and during this time has steadily and zealously busied itself with its critical elaboration and with the exact determination of its scope, that now the estimation in which it is held should apparently be on the decrease. It would be easy to enumerate a long list of living writers who assign to it a subordinate part only in evolution, or none at all. One of our youngest biologists speaks without ado of the "pretensions of the refuted Darwinian theory, so called,"¹ and one of the oldest and most talented inquirers of our time, a pioneer in the theory of evolution, who is unfortunately now gone to his rest, Thomas Huxley, implicitly yet distinctly intimated a doubt regarding the principle of selection when he said: "Even if the Darwinian hypothesis were swept away, evolution would still stand where it is." Therefore, he, too, regarded it as not impossible that this hypothesis should disappear from among the great explanatory principles by which we seek to approach nearer to the secrets of nature.

I am not of that opinion. I see in the growth of doubts regarding the principle of selection and in the pronounced and frequently bitter opposition which it encounters, a transient depression only of the wave of opinion, into which every scientific theory must descend after having been exalted, here perhaps with undue swiftness, to the highest pinnacle of recognition. It is the natural reaction from its overestimation, which is now followed by an equally exaggerated underestimation. The principle of selection was not overrated in the sense of ascribing to it too much explanatory efficacy, or of extending too far its sphere of operation, but in the sense that naturalists imagined that they perfectly understood its ways of work-

¹ Hans Driesch, *Die Biologie als selbstständige Grundwissenschaft*, Leipsic, 1893, p. 31, footnote. The sentence reads: "An examination of the pretensions of the refuted Darwinian theory, so called, would be an affront to our readers."

ing and had a distinct comprehension of its factors, which was not so. On the contrary, the deeper they penetrated into its workings the clearer it appeared that something was lacking, that the action of the principle, though upon the whole clear and representable, yet when carefully looked into encountered numerous difficulties, which were formidable, for the reason that we were unsuccessful in tracing out the actual details of the individual process, and, therefore, in *fixing* the phenomenon as it actually occurred. We can state in no single case how great a variation must be to have selective value, nor how frequently it must occur to acquire stability. We do not know when and whether a desired useful variation really occurs, nor on what its appearance depends; and we have no means of ascertaining the space of time required for the fulfilment of the selective processes of nature, and hence cannot calculate the exact number of such processes that do and can take place at the same time in the same species. Yet all this is necessary if we wish to follow out the precise details of a given case.

But perhaps the most discouraging circumstance of all is, that we can assert in scarcely a single actual instance in nature whether an observed variation is useful or not—a drawback that I distinctly emphasised some time ago.¹ Nor is there much hope of betterment in this respect, for think how impossible it would be for us to observe all the individuals of a species in all their acts of life, be their habitat ever so limited—and to observe all this with a precision enabling us to say that this or that variation possessed selective value, that is, was a decisive factor in determining the existence of the species.

In many cases we can reach at least a probable inference, and say, for example, that the great fecundity of the frog is a property having selective value, basing our inference on the observation that in spite of this fertility the frogs of a given district do not increase.

But even such inferences offer only a modicum of certainty. For who can say precisely how large this number is? Or whether it

¹ *Die Allmacht der Naturzüchtung*. A Reply to Herbert Spencer. Jena, 1893, p. 27 et seq. [Also in the *Contemporary Review* for September, 1893.]

is on the increase or on the decrease? And besides, the exact degree of the fecundity of these animals is far from being known. Rigorously viewed, we can only say that great fecundity must be advantageous to a much-persecuted animal.

And thus it is everywhere. Even in the most indubitable cases of adaptation, as, for instance, in that of the striking protective coloring of many butterflies, the sole ground of inference that the species upon the whole is adequately adapted to its conditions of life, is the simple fact that the species is, to all appearances, preserved undiminished, and the inference is not at all permissible that just this protective coloring has selective value for the species, that is, that if it were lacking, the species would necessarily have perished.

It is not inconceivable that in many species to-day these colorings are actually unnecessary for the preservation of the species, that they formerly were, but that now the enemies which preyed on the resting butterflies have grown scarce or have died out entirely, and that the protective coloring will continue to exist by the law of inertia¹ only for a short while, till panmixia or new adaptations shall modify it.

Discouraging, therefore, as it may be, that the control of nature in her minutest details is here gainsaid us, yet it were equivalent to sacrificing the gold to the dross, if simply from our inability to follow out the details of the individual case we should renounce altogether the principle of selection, or should proclaim it as only subsidiary, on the ground that we believe the protective coloring of the butterfly is not a protective coloring but a combination of colors inevitably resulting from internal causes. The protective coloring remains a protective coloring whether at the time in question it is or is not necessary for the species; and it arose as protective coloring—arose not because it was a constitutional necessity of the animal's organism that here a red and there a white, black, or yellow spot should be produced, but because it was advantageous, because

¹ That is, by the law of exceedingly slow retrogression of superfluous characters, which may be designated the law of organic inertia.

it was necessary for the animal. There is only one explanation possible for such patent adaptations and that is selection. What is more, no other natural way of their originating is conceivable, for we have no right to assume teleological forces in the domain of natural phenomena.

I have selected the example of the butterfly's wing, not solely because it is so widely known, but because it is so exceedingly instructive, because we are still able to learn so much from it. It has been frequently asserted that the color-patterns of the butterfly's wings have originated from internal causes, independently of selection and conformably to inward laws of evolution. Eimer has attempted to prove this assertion by establishing in a division of the genus *Papilio* the fact that the species there admit of arrangement in series according to affinity of design. But is a proof that the markings are modified in definite directions during the course of the species's development, equivalent to a definite statement as to the *causes* that have produced these gradual transformations? Or, is our present inability to determine with exactness the biological significance of these markings and their modifications, a proof that the same have no significance whatever? On the contrary, I believe it can be clearly proved that the wing of the butterfly is a tablet on which nature has inscribed everything she has deemed advantageous to the preservation and welfare of her creatures, and nothing else; or, to abandon the simile, that these color-patterns have not proceeded from inward evolutionary forces but are the result of selection. At least in all places where we do understand their biological significance these patterns are constituted and distributed over the wing exactly as utility would require.

I do not pledge myself, of course, to give an explanation of every spot and every line on a wing. The inscription is often a very complicated one, dating from remote and widely separated ages; for every single existing species has inherited the patterns of its ancestral species and that again the patterns of a still older species. Even at its origin, therefore, the wing was far from being a *tabula rasa*, but was a closely written and fully covered sheet, on which there was no room for new writing until a portion of the old

had been effaced. But other parts were preserved, or only slightly modified, and thus in many cases gradually arose designs of almost undecipherable complexity.

I should be far from maintaining that the markings arose unconformably to law. Here, as elsewhere, the dominance of law is certain. But I take it, that the laws involved, that is, the physiological conditions of the variation, here are without exception subservient to the ends of a higher power—utility; and that it is utility primarily that determines the kind of colors, spots, streaks, and bands that shall originate, as also their place and mode of disposition. The laws come into consideration only to the extent of conditioning the quality of the constructive materials—the variations, out of which selection fashions the designs in question. And this also is subject to important restrictions, as will appear in the sequel.

The meaning of formative laws here is that definite spots on the surfaces of the wings are linked together in such a manner by inner, invisible bonds, as to represent the same spots or streaks, so that we can predict from the appearance of a point at one spot the appearance of another similar point at another, and so on. It is an undoubted fact that such relations exist, that the markings frequently exhibit a certain symmetry, that—to use the words of the most recent observer on this subject, Bateson¹—a meristic representation of equivalent design-elements occurs. But I believe we should be very cautious in deducing laws from these facts, because all the rules traceable in the markings apply only to small groups of forms and are never comprehensive nor decisive for the entire class or even for the single sub-class of diurnal butterflies, in fact, often not so for a whole genus. All this points to special causes operative only within this group.

If internal laws controlled the markings on butterflies' wings, we should expect that some general rule could be established, requiring that the upper and under surfaces of the wings should be

¹ *Materials for the Study of Variation with Especial Regard to Discontinuity in the Origin of Species.* London, 1895.

alike or that they should be different, or that the fore wings should be colored the same as or differently from the hind wings, etc. But in reality all possible kinds of combinations occur simultaneously, and no rule holds throughout. Or, it might be supposed that bright colors should occur only on the upper surface or only on the under surface, or on the fore wings or only on the hind wings. But the fact is, they occur indiscriminately, now here, now there, and no one method of appearance is uniform throughout all the species. But the fitness of the various distributions of colors is apparent, and the moment we apply the principle of utility we know why in the diurnal butterflies the upper surface alone is usually variegated and the under surface protectively colored, or why in the nocturnal butterflies the fore wings have the appearance of bark, of old wood, or of a leaf, whilst the hind wings, which are covered when resting, alone are brilliantly colored. On this theory we also understand the exceptions to these rules. We comprehend why Danaids, Heliconids, Euploids, and Acracids, in fact all diurnal butterflies, offensive to the taste and smell, are mostly brightly marked and equally so on both surfaces, whilst all species not thus exempt from persecution have the protective coloring on the under surface and are frequently quite differently colored there from what they are on the upper.

In any event, the supposed formative laws are not obligatory. Dispensations from them can be issued and are issued *whenever utility requires it*. Indeed, so far may these transgressions of the law extend, that in the very midst of the diurnal butterflies is found a genus, the South American *Ageronia*, which, like the nocturnal butterfly, shows on the entire *upper* surface of both wings a pronounced bark-coloration, and concerning which we also know, (and in this respect it is an isolated genus and differs from almost all other diurnal butterflies,) that it spreads out its wings when at rest like the nocturnal butterfly, and does not close them above it as its relatives do. Therefore, entirely apart from cases of mimicry, which after all constitute the strongest proof, the facts here cited are alone sufficient to remove all doubt that not inner necessities or so-called form-

ative laws have painted the surface of the butterflies' wings, but that the conditions of life have wielded the brush.

This becomes more apparent on considering the details. I have remarked that the usually striking colorations of exempt butterflies, as of the Heliconids, are the same on both the upper and the lower surfaces of the wings. Possibly the expression of a law might be seen in this fact, and it might be said, the coloration of the Heliconids *runs through* from the upper to the under surface. But among numerous imitators of the Heliconids is the genus *Protopogonius*, which has the coloration of the Heliconids on its upper surface, but on its lower exhibits a magnificent leaf-design. During flight it appears to be a Heliconid and at rest a leaf. How is it possible that two such totally different types of coloration should be combined in a single species, if any sort of *inner* rigorous necessity existed, regulating the coloration of the two wing-surfaces? Now, although we are unable to prove that the *Protopogonius* species would have perished unless they possessed this duplex coloration, yet it would be nothing less than intellectual blindness to deny that the butterflies in question are effectively protected, both at rest and during flight, *that their colorations are adaptive*. We do not know their primitive history, but we shall hardly go astray if we assume that the ancestors of the *Protopogonius* species were forest-butterflies and already possessed an under surface resembling a leaf. By this device they were protected when at rest. Afterwards, when this protection was no longer sufficient, they acquired on their upper surface the coloration of the exempt species with which they most harmonised in abode, habits of life, and outward appearance.

At the same time it is explained why these butterflies did not acquire the coloration of the Heliconids on the under surface. The reason is, that in the attitude of repose they were already protected, and that in an admirable manner.

That *exempt* diurnal butterflies should be colored on the upper and under surfaces alike, and should never resemble in the attitude of repose their ordinary surroundings, is intelligible when we reflect that it is a much greater protection to be despised when discovered

than to be well, or very well, but never absolutely, protected from discovery.

It has been so often reiterated that diurnal butterflies, as a rule, are protectively colored on the under surfaces, that one has some misgivings in stating the fact again. And yet the least of those who hold this to be a trivial commonplace know how strongly its implications militate against the inner motive and formative forces of the organism, which are ever and anon appealed to. No less than sixty-two genera are counted to-day in the family of diurnal butterflies known as the *Nymphalidæ*. Of these by far the largest majority are sympathetically colored underneath, that is, they show in the posture of rest the colorings of their usual environment. In a large number of the species belonging to this group the entire surface of the hind wings possesses such a sympathetic coloration, as does also the distant apex of the fore wings. Why? The reason is obvious. This part only of the fore wing is visible in the attitude of repose. Here, then,—as a zealous opponent of the theory of selection once exclaimed,—there is undoubted “correlation” between the coloring of the surface of the hind wing and of the apex of the fore wing. Correlation is unquestionably a fine word, but in the present instance it contributes nothing to the understanding of the problem, for there are near relatives and often species of the same genera in which this correlation is not restricted to the apex of the fore wings, but extends to a third or even more of their wings, and these species are also in the habit of drawing back their wings less completely in the state of rest, thus rendering a larger portion of them visible. There are species, too, like the forest-butterflies of South America just mentioned, the *Protogonius*, *Anæa*, *Kallima* species, etc., which have nearly the *whole* of the under surfaces of their fore wings marked according to the same pattern with their hind wings, and these butterflies when at rest hold their fore wings free and uncovered by their hind wings. Where are the formative laws in such cases?

Or, perhaps some one will say: “The covering by the hind wings hinders the formation of scales on the wing, or impedes the formation of the colors in the scales.” Such a person should exam-

ine one of these species. He will find that the scales are just as dense on the covered as on the uncovered surface of the wing, and in many species, for example, in *Katagramma*, the scales of the covered surface are colored most brilliantly of all.

But the facts are still more irresistible, when we consider *special adaptations*; for example, the imitation of leaves, which is so often cited. It is to be noted, first, that this sort of imitation is by no means restricted to a few genera, still less to a few species. All the numerous species of the genus *Anæa*, which are distributed over the forests of tropical South America, exhibit this imitation in pronounced and varied forms, as do likewise the American genera *Hypna* and *Siderone*, the Asiatic *Symphaedra*, the African *Salamis*, *Eurypheme*, etc. I have observed fifty-three genera in which it is present in one, several, or in many species, but there are many others.

These genera, now, are by no means all so nearly allied that they could have inherited the leaf-markings from a common ancestral form. They belong to different continents and have probably for the most part acquired their protective colorings themselves. But one resemblance they have in common—they are all *forest-butterflies*. Now what is it that has put so many genera of forest-butterflies and no others into positions where they could acquire this resemblance to leaves? Was it directive formative laws? If we closely examine the markings by which the similarity of the leaf is determined, we shall find, for example, in *Kallima Inachis*, and *Parallecta*, the Indian leaf-butterflies, that the leaf-markings are executed *in absolute independence of the other uniformities governing the wing*.

From the tail of the wing to the apex of the fore wings runs with a beautiful curvature a thick, doubly-contoured dark line accompanied by a brighter one, representing the midrib of the leaf. This line cuts the “veins” and the “cells” of the leaf in the most disregardful fashion, here in acute and here in obtuse angles, and in absolute independence of the regular system of divisions of the wing, which should assuredly be the expression of the “formative law of the wing,” if that were the product of an internal directive principle. But leaving this last question aside, this much is certain

with regard to the markings, that they are dependent, not on an *internal*, but on an *external* directive power.

Should any one be still unconvinced by the evidence we have adduced, let him give the leaf-markings a closer inspection. He will find that the midrib is composed of two pieces of which the one belongs to the hind wing and the other to the fore wing, and that the two fit each other exactly when the butterfly is in the attitude of repose, but not otherwise. Now these two pieces of the leaf-rib do not begin on corresponding spots of the two wings, but on absolutely non-identical spots. And the same is also true of the lines which represent the lateral ribs of the leaf. These lines proceed in acute angles from the rib; to the right and to the left in the same angle, those of the same side parallel with each other. Here, too, no relation is noticeable between the parts of the wings over which the lines pass. The venation of the wing is utterly ignored by the leaf-markings, and its surface is treated as a *tabula rasa* upon which anything conceivable can be drawn. In other words, we are presented here with a *bilaterally symmetrical* figure engraved on a surface which is essentially *radially symmetrical* in its divisions.

I lay unusual stress upon this point because it shows that we are dealing here with one of those cases which cannot be explained by mechanical, that is, by natural means, unless natural selection actually exists and is actually competent to create new properties; for the Lamarckian principle is excluded here *ab initio*, seeing that we are dealing with a formation which is only passive in its effects: the leaf-markings are effectual simply by their existence and not by any function which they perform; they are present in flight as well as at rest, during the absence of a danger, as well as during the approach of an enemy.

Nor are we helped here by the assumption of *purely internal motive forces*, which Nägeli, Askenasy, and others have put forward as supplying a *mechanical* force of evolution. It is impossible to regard the coincidence of an Indian butterfly with the leaf of a tree now growing in an Indian forest as fortuitous, as a *lusus naturæ*. Assuming this seemingly mechanical force, therefore, we should be led back inevitably to a teleological principle which produces adap-

tive characters and which must have deposited the directive principle in the very first germ of terrestrial organisms, so that after untold ages at a definite time and place the illusive leaf-markings should be developed. The assumption of pre-established harmony between the evolution of the ancestral line of the tree with its prefigurative leaf, and that of the butterfly with its imitating wing, is absolutely necessary here, as I pointed out many years ago,¹ but as is constantly forgotten by the promulgators of the theory of internal evolutionary forces.

For the present I leave out of consideration altogether the question as to the conceivable extent of the sphere of operation of natural selection; I am primarily concerned only with elucidating the process of selection itself, wholly irrespective of the comprehensiveness or limitedness of its sphere of action. For this purpose it is sufficient to show, as I have just done, *that cases exist wherein all natural explanations except that of selection fail us*. But let us now see how far the principle of selection will carry us in the explanation of such cases—natural selection, I mean, as it was formulated by Darwin and Wallace.

There can be no doubt but the leaf-markings readily admit of production in this manner, slowly and with a gradual but constant increase of fidelity, provided a single condition is fulfilled: *the occurrence of the right variations at the right place*. But just here, it would seem, is the insurmountable barrier to the explanatory power of this principle, for who, or what, is to be our guarantee that dark scales shall appear at the exact spots on the wing where the midrib of the leaf must grow? And that later dark scales shall appear at the exact spots to which the midrib must be prolonged? And that still later such dark scales shall appear at the places whence the lateral ribs start, and that here also a definite acute angle shall be accurately preserved, and the mutual distances of the lateral ribs be alike and their courses parallel? And that the prolongation of the median rib from the hind wing to the fore wing shall be ex-

¹ *Studien zur Descendenztheorie*, Leipsic, 1876. Vol. II, pp. 295 and 322.

tended exactly to that spot where the fore wing is not covered by the hind wing in the attitude of repose? And so on.

If I could go more minutely into this matter, I should attempt to prove that the markings, as I have just assumed, have not risen suddenly, but were perfected very, very, gradually; that in one species they began on the fore wing and in another on the hind wing; and that in many they never until recently proceeded beyond one wing, in other species they went only a little way, and in only a few did they spread over the entire surface of both wings.

That these markings advanced slowly and gradually, but with marvellous accuracy, is no mere conjecture. But it follows that the right variations at the right places must never have been wanting, or, as I expressed it before: *the useful variations were always present*. But how is that possible in such long extensive lines of dissimilar variations as have gradually come to constitute markings of the complexity here presented? Suppose that the useful colors had not appeared at all, or had not appeared at the right places? It is a fact that in constant species, that is, in such as are not in process of transformation, the variations of the markings are by no means frequent or abundant. Or, suppose that they had really appeared, but occurred only in individuals, or in a small percentage of individuals?

Such are the objections raised against the theory of selection by its opponents, and put forward as insurmountable obstacles to the process. Nor are such objections relevant only in the case of protective colorings; they are applicable in all cases where the process of selection is concerned. Take the case of instincts that are called into action only once in life, as, for example, the pupal performances of insects, the artificial fabrication of cocoons, etc. How is it that the useful variations were always present here? And yet they must have been present, if such complicated spinning instincts could have taken their rise as are observable in the silk-worm, or in the emperor-moth. And they have been developed, and that in whole families, in forms varying in all species, and in every case adapted to the special wants of the species.

Particularly striking is the proof afforded of this constant pres-

ence of the useful variations by cases where we meet with the development of highly special adaptations that are uncommon even for the group of organisms concerned. Such a case, for example, is the apparatus designed for the capture of small animals and their digestion, found in widely different plants and widely separated families. On the other hand, very common adaptations, such as the eyes of animals, show distinctly that in all cases where it was necessary, the useful variations for the formation of an eye were presented, and were presented further exactly at spots at which organs of vision could perform their best work: thus, in Turbellaria and many other worms that live in the light, at the anterior extremity of the body and on the dorsal surface; in certain mussels, on the edge of the mantle; in terrestrial snails, on the antennæ; in certain tropical marine snails, inhabiting shallow waters, on the back; and in the chitons even on the dorsal surface of the shell!

But even taking the very simplest cases of selection, it is impossible to do without this assumption, that the useful variations are always present, or that *they always exist in a sufficiently large number of individuals for the selective process*. You know the thickness and power of resistance of the egg-shells of round-worms. The eggs of the round-worms of horses have been known to continue their course of development undisturbed even after they had been thrown into strong alcohol and all other kinds of injurious liquids—much to the vexation of the embryologists, who wished to preserve a definite stage of development and sought to kill the embryo at that stage. Indeed, think of the result, if in the course of their phylogenesis stout and resistant variations of egg-shells had not been presented in these worms, or had not always been presented, or had not been presented in every generation and not in sufficient quantities.

The cogency of the facts is absolutely overpowering when we consider that practically no modification occurs *alone*, that every primary modification brings in its train secondary ones, and that these induce forced modifications in many parts of the body, frequently of the most diversified, or even self-contradictory, forms. Recently Herbert Spencer has drawn fresh attention to these sec-

ondary modifications, which must always occur in harmony with the primary one, and has, as he thinks, advanced in this set of facts, a convincing disproof of the contention that such coadaptive modifications of numerous cofunctioning parts can rest on natural selection. Now, although I deem his conclusion precipitate, yet the very fact of a simultaneous, functionally concordant, yet essentially diversified modification of numerous parts, points conclusively to the circumstance that *something is still wanting to the selection of Darwin and Wallace, which it is obligatory on us to discover, if we possibly can*, and without which selection as yet offers no complete explanation of the phyletic processes of transformation. There is a hidden secret to be unriddled here before we can obtain a satisfactory insight into the phenomena in question. *We must seek to discover why it happens that the useful variations are always present.*

Herbert Spencer appealed to Lamarck's principle for the explanation of coadaptation, and it is certain that functional adaptation is operative during the individual life, and that it compensates in a certain measure the inequalities of the inherited constitutions. I shall not repeat what I have said before on this subject, nor maintain, in refutation of Spencer's contention, that functional adaptation is itself nothing else than the efflux of *intra-biontic* selective processes, as Spencer himself once suggested in a prophetic moment, but which it was left for Wilhelm Roux to introduce into science as "the struggle of the parts" of organisms.¹ I shall only remark that if functional adaptations were themselves inheritable, this would still be insufficient for the explanation of coadaptation, for the reason that precisely similar coadaptive modifications occur in *purely passively* functioning parts, in which, consequently, modification *by* function is excluded. This is the case with the skeletal parts of Articulata; e. g., it is true of their articular surfaces with their complex adaptations to the most varied forms of locomotion. In all these cases the ready-made, hard, unalterable, chitinous part is *first* set into activity; consequently its adaptation to the function must have

¹ Compare my essay, *Neue Gedanken zur Vererbungsfrage*, Jena, 1895, p. 10, second footnote.

been *previously* effected, independently of that function. These joints, and divers other parts, accordingly, have been developed in the precisest manner for the function, and the latter could have had no direct share in their formation. When we consider, now, that it is impossible that every one of the numerous surfaces, ridges, furrows, and corners found in a single such articulation, let alone in all the articulations of the body, should hold in its hands the power of life and death over individuals for untold successions of generations, the fact is again unmistakably impressed upon our attention that the conception of the selective processes which has hitherto obtained is insufficient, that the root of the process in fact lies deeper, that it is to be found in the place where it is determined what variations of the parts of the organism shall appear—namely, *in the germ*.

The phenomena observed in the *stunting*, or *degeneration*, of *parts rendered useless*, point to the same conclusion. They show distinctly that ordinary selection which operates by the removal of entire persons, *personal selection*, as I prefer to call it, cannot be the only cause of degeneration; for in most cases of degeneration it cannot be assumed that slight individual vacillations in the size of the organ in question have possessed selective value. On the contrary, we see such retrogressions effected apparently *in the shape of a continuous evolutionary process determined by internal causes*, in the case of which there can be no question whatever of selection of persons or of a survival of the fittest, that is, of individuals with the smallest rudiments.

It is this consideration principally that has won so many adherents for the Lamarckian principle in recent times, particularly among the paleontologists. They see the outer toes of hoofed animals constantly and steadily degenerating through long successions of generations and species, concurrently with the re-enforcement of one or two middle toes, which are preferred or are afterwards used exclusively for stepping, and they believe correctly enough that these results should not be ascribed to the effects of personal selection alone. They demand a principle which shall effect the degeneration by internal forces, and believe that they have found it in func-

tional adaptation.¹ On this last point, now, I believe, they are mistaken, be they ever so strongly convinced of the correctness of their view and ever so aggressive and embittered in their defence of it.

Recently, an inquirer of great caution and calmness of judgment, Prof. C. Lloyd Morgan, has expressed the opinion that the Lamarckian principle must at least be admitted as a working hypothesis. But with this I cannot agree, at least as things stand at present. A working hypothesis may be false, and yet lead to further progress; that is, it may constitute an advance to the extent of being useful in formulating the problem and in illuminating paths that are likely to lead to results. But it seems to me that a hypothesis of this kind has performed its services and must be discarded the moment it is found to be at hopeless variance with the facts. If it can be proved that precisely the same degenerative processes also take place in such superfluous parts as have only *passive* and not active functions, as is the case with the *chitinous parts of the skeleton of Arthropoda*, then it is a demonstrated fact, that the cessation of functional action is not the efficient cause of the process of degeneration. At once your legitimate working hypothesis is transformed into an illegitimate dogma—illegitimate because it no longer serves as a guide on the path to knowledge but blocks that path. For the person who is convinced he has found the right explanation is not going to seek for it.

¹ On the same day on which the present address was delivered at the International Congress of Zoölogists in Leyden, and on the same occasion, Dr. W. B. Scott, Professor of Geology in Princeton College, New Jersey, read a very interesting paper on the tertiary mammalian fauna of North America, in which, without a knowledge of my paper, he took his stand precisely on this argument and arrived at the opinion that it could not possibly be the ordinary individual variations which accomplished phyletic evolution, but that it was necessary to assume in addition phyletic variations. I believe our views are not as widely remote as might be supposed. Of course, I see no reason for assuming two kinds of hereditary variations, different *in origin*. Still it is likely that only a relatively small portion of the numberless individual variations lie on the path of phyletic advancement and so under the *guidance* of germinal selection mark out the way of further development; and hence it would be quite possible in this sense to distinguish continuous, *definitely directed* individual variations from such as fluctuate hither and thither with no uniformity in the course of generations. The root of the two is of course the same, and they admit of being distinguished from each other only by their success, phyletic modification, or by their failure.

I can understand perfectly well the hesitation that has prevailed on this point in many minds, from their having seen *one* aspect of the facts more distinctly than the other. From this sceptical point of view Osborn has drawn the following perfectly correct conclusion: "If acquired variations are transmitted, there must be some unknown principle in heredity; if they are not transmitted, there must be some unknown factor in evolution."¹

Such in fact is the case and I shall attempt to point out to you what this factor is. My inference is a very simple one: if we are forced by the facts on all hands to the assumption that the useful variations which render selection possible are always present, then, *some profound connexion must exist between the utility of a variation and its actual appearance*, or, in other words, *the direction of the variation of a part must be determined by utility*, and we shall have to see whether facts exist that confirm our conjecture.

The facts do indeed exist and lie before our very eyes, despite their not having been recognised as such before. All *artificial selection* practised by man rests on the fact that by means of the selection of individuals having a given character slightly more pronounced than usual, there is gradually produced a general augmentation of this character, which subsequently reaches a point never before attained by any individual of this species. I shall choose an example which seems to me especially clear and simple because only one character has been substantially modified here. The long-tailed variety of domestic cock, now bred in Japan and Corea, owes its existence to skilful selection and not at all to the circumstance that at some period of the race's history a cock with tail-feathers six feet in length suddenly and spasmodically appeared. At the present day even, as Professor Ischikawa of Tokio writes me, the breeders still make extraordinary efforts to increase the length of the tail, and every inch gained adds considerably to the value of the bird. Now nothing has been done here whatever except to select for purposes of breeding always the cocks with the

¹ H. F. Osborn, "The Hereditary Mechanism and the Search for the Unknown Factors of Evolution," in *Biological Lectures delivered at the Marine Biolog. Lab. at Wood's Holl in the Summer Session of 1894*. Boston, 1895.

longest feathers ; and in this way alone were these feathers, after the lapse of many generations, prolonged to a length far exceeding every previous variation.

I once asked a famous dove-fancier, Mr. W. B. Tegetmeier of London, whether it was his opinion that by artificial selection alone a character could be augmented. He thought a long time and finally said : " It is without our power to do anything if the variation which we seek is not presented, but once that variation is given, then I think the augmentation can be effected." And that in fact is the case. If cocks had never existed whose tail-feathers were a little longer than usual the Japanese breed could never have originated ; but as the facts are, always the cocks with the longest feathers were chosen from each generation, and these only were bred, and thus a hereditary augmentation of the character in question was effected, which would hardly have been deemed possible.

Now what does this mean? Simply that the hereditary diathesis, the germinal constitution (the *Anlage*) of the breed was changed in the respect in question, and our conclusion from this and numerous similar facts of artificial selection runs as follows : *by the selection alone of the plus or minus variations of a character is the constant modification of that character in the plus or minus direction determined.* Obviously the hereditary *diminution* of a part is also effected by the simple selection of the individuals in each generation possessing the smallest parts, as is proved, for example, by the tiny bills and feet of numerous breeds of doves. We may assert, therefore, in general terms : a definitely directed progressive variation of a given part is produced by continued selection in that definite direction. This is no hypothesis, but a direct inference from the facts and may also be expressed as follows : *By a selection of the kind referred to the germ is progressively modified in a manner corresponding with the production of a definitely directed progressive variation of the part.*

In this general form the proposition is not likely to encounter opposition, as certainly no one is prepared to uphold the view that the germ remains unchanged whilst the products proceeding from it, its descendants, are modified. On the contrary, all will agree

when I say that the germ in this case must have undergone modifications, and that their character must correspond with the modifications undergone by its products. Thus far, then, we find ourselves, not on the ground of the hypothesis that has been lately so much maligned, but on the ground of facts and of direct inferences from facts. But if we attempt to pierce deeper into the problem, we are in need of the hypothesis.

The first and most natural explanation will be this—that through selection the zero-point, about which, figuratively speaking, the organ may be said to oscillate in its plus and minus variations, is displaced upwards or downwards. Darwin himself assumed that the variations oscillated about a mean point, and the statistical researches of Galton, Weldon, and others have furnished a proof of the assumption. If selection, now, always picks out the plus variations for imitation, perforce, then, the mean or zero point will be displaced in the upward direction, and the variations of the following generation will oscillate about a higher mean than before. This elevation of the zero-point of a variation would be continued in this manner until the total equilibrium of the organism was in danger of being disturbed.

There is involved here, however, an assumption which is by no means self-evident, that every advancement gained by the variation in question constitutes a new centre for the variations occurring in the following generation. *That this is a fact*, is proved by such actual results of selection as are obtained in the case of the Japanese cock. But the question remains, Why is this the fact?

Now here, I think, my theory of determinants gives a satisfactory answer. According to that theory every independently and hereditarily variable part is represented in the germ by a *determinant*, that is, by a determinative group of vital units, whose size and power of assimilation correspond to the size and vigor of the part. These determinants multiply, as do all vital units, by growth and division, and necessarily they increase rapidly in every individual, and the more rapidly the greater the quantity of the germinal cells the individual produces. And since there is no more reason for excluding irregularities of passive nutrition, and of the supply

of nutriment in these minute, microscopically invisible parts, than there is in the larger visible parts of the cells, tissues, and organs, consequently the descendants of a determinant can never all be exactly alike in size and capacity of assimilation, but they will oscillate in this respect to and fro about the maternal determinant as about their zero-point, and will be partly greater, partly smaller, and partly of the same size as that. In these oscillations, now, the material for further selection is presented, and in the inevitable fluctuations of the nutrient supply I see the reason why every stage attained immediately becomes the zero-point of new fluctuations, and consequently why the size of a part can be augmented or diminished by selection without limit, solely by the displacement of the zero-point of variation as the result of selection.

We should err, however, if we believed that we had penetrated to the root of the phenomenon by this insight. There is certainly some other and mightier factor involved here than the simple selection of persons and the consequent displacement of the zero-point of variation. It would seem, indeed, as if in one case, *videlicet*, in that of the Japanese cock, the augmentation of the character in question were completely explained by this factor *alone*. In fact, in this and similar cases we cannot penetrate deeper into the processes of variation, and therefore cannot say *a priori* whether other factors have or have not been involved in the augmentation of the character in question—other characters, that is, than the simple displacement of the zero-point. There is, however, another class of phyletic modifications, which point unmistakably to the conclusion that the displacement of the zero-point of variation by personal selection is not and cannot be the only factor in the determination and accomplishment of the direction of variation. I refer to *retrogressive development*, the gradual degeneration of parts or characters that have grown useless, the gradual disappearance of the eye in cave-animals, of the legs in snakes and whales, of the wings in certain female butterflies, in short, that entire and enormous mass of facts comprehended under the designation of “rudimentary organs.”

I have endeavored on a previous occasion to point out the significance of the part played in the great process of animate evolu-

tion by these retrogressive growths, and I made at the time the statement that "the phenomena of retrogressive growth enabled us in a greater measure almost than those of progressive growth to penetrate to the causes which produce the transformations of animate nature." Although at that time¹ I had no inkling of certain processes which I shall seek to-day to prove the existence of, yet my statement receives a fresh confirmation from these facts.

For in most retrogressive processes *active* selection in Darwin's sense plays no part, and advocates of the Lamarckian principle, as above remarked, have rightly denied that active selection, that is, the selection of individuals possessing the useless organ in its most reduced state, is sufficient to explain the process of degeneration. I, for my part, have never assumed this, and have on this very account enunciated the *principle of panmixia*. Now, although this, as I have still no reason for doubting, is a perfectly correct principle, which really does have an essential and indispensable share in the process of retrogression, still it is not *alone* sufficient for a full explanation of the phenomena. My opponents, in advancing this objection, were right, to the extent indicated, and as I expressly acknowledge, although they were unable to substitute anything positive in its stead or to render my explanation complete. The very fact of the cessation of control over the organ is sufficient to explain its *degeneration*, that is, its deterioration, the disharmony of its parts, but not the fact which actually and always occurs where an organ has become useless—viz., *its gradual and unceasing diminution continuing for thousands and thousands of years and culminating in its final and absolute effacement*.

If, now, neither the selection of persons nor the cessation of personal selection can explain this phenomenon, assuredly some other principle must be the efficient cause here, and this cause I believe I have indicated in an essay written at the close of last year and only recently published.¹ I call it *germinal selection*.

¹In 1886. See my paper on "Retrogression in Nature," published in English in Nos. 105, 107, 108, and 109 of *The Open Court*, and also in my essays on *Heredity*, Jena, 1892.

²*Neue Gedanken zur Vererbungsfrage*, Jena, 1895.

The principle in question reposes on the application, made some fifteen years ago by Wilhelm Roux, of the principle of selection to the *parts* of organisms—on the *struggle of the parts*, as he called it. If such a struggle obtains among organs, tissues, and cells, it must also obtain between the smallest and for us invisible vital particles, not only between those of the body-cells, strictly so called, but also between those of the germinal cells. Roux himself spoke of the struggle of the molecules, by which he presumably understood the smallest ultimate units of vital phenomena—elements which De Vries designated pangenesis, Wiesner plasomes, and I *biophores*, after Brücke's ingenious conception¹ of these invis-

¹Delâge, in *La structure du protoplasma et les théories sur l'hérédité*, etc., Paris, 1895, is mistaken in attributing to Herbert Spencer the merit of first having pointed out the necessity of the assumption of biological units ranking between the molecule and the cell. Brücke set forth this idea three years previously to Spencer and established it exhaustively in a paper which in Germany at least is famous ("Elementarorganismen," *Wiener Sitzungsberichte*, October 10, 1861, Vol. XLIV., II., p. 381). Spencer's *Principles of Biology* appeared between 1864 and 1868; consequently there can be no dispute touching the priority of the idea. Strangely enough Delâge cites Brücke's essay in the Bibliographical Index at the end of his book correctly, although Brücke's name and views are nowhere mentioned in the book itself. It is to be observed, however, that the elementary organisms of Brücke are not merely the precursors of Spencer's "physiological units," but repose on much firmer foundations than the latter, which, as Delâge himself remarks, are at bottom nothing more than magnified molecules and not combinations of different molecules of such character as to produce necessarily phenomena of life. He aptly remarks on this point: "the physiological units of Spencer are only chemical molecules of greater complexity than the rest, and as he defines them they would be regarded as such by every chemist. He attributes to them no property essentially different from those of chemical molecules." Assimilation, growth, propagation, in short the attributes of life, are not attributed by Spencer to his units, while Brücke in his very designation "elementary organisms" expresses the idea of "ultimate living units," to use Wiesner's phrase. Of course this particular aspect of the vital units was not emphasised by Brücke with the same distinctness and sharpness as by recent inquirers, who took up Brücke's ideas thirty years after. I refer to the conception that the union of a definite combination of heterogeneous molecules into an invisibly small unit, forms the cradle or focus of the vital phenomena. This was first done and apparently on independent considerations by De Vries, and soon after by Wiesner, and subsequently by myself (De Vries, *Intracelluläre Pangenesis*, Jena, 1889; Wiesner, *Die Elementarstruktur und das Wachsthum der lebenden Substanz*, Vienna, 1892; Weismann, *Das Keimplasma*, Jena, 1892). Let me say at the close of this note that it is not my intention in thus defending the rights of a great physiologist, to censure in the least the distinguished author of *L'hérédité* who has set himself a remarkably high standard of exactitude in such matters. Cer-

ible entities had been almost totally forgotten, or at least had lain unnoticed for thirty years. No struggle, as that is understood in the theory of selection, could take place between real molecules, as molecules are neither nourished, subject to growth, nor propagated.

The gradual degeneration of organs grown useless may be explained, now, by the theory of determinants very simply and without any co-operation on the part of active personal selection, as follows.

Nutrition, it is known, is not merely a passive process. A part is not only *nourished* but also actively *nourishes* itself, and the more vigorously, the more powerful and capable of assimilation it is. Hence powerful determinants in the germ will absorb nutriment more rapidly than weaker determinants. The latter, accordingly, will grow more slowly and will produce weaker descendants than the former.

Let us assume, now, that a part of the body, say the hinder extremity of the quadruped ancestors of our common whales, are rendered useless. Panmixia steps in, that is, selection ceases to influence this organ. Individuals with large and individuals with small hind legs are equally favored in the struggle for existence.

From this fact alone would result a degradation of the organ, but of course it would not be very marked in extent, seeing that the minus variations which occur are now no longer removed. According to our assumption, however, such minus variations repose on the weaker determinants of the germ, that is, on such as absorb nutriment less powerfully than the rest. And since every determinant battles stoutly with its neighbors for food, that is, takes to itself as much of it as it can, consonantly with its power of assimilation and proportionately to the nutrient supply, therefore the impoverished neighbors of this minus determinant will deprive it of its nutriment more rapidly than was the case with its more robust ancestors; hence, it will be unable to obtain the full quantum of food corresponding even to its weakened capacity of assimilation,

tainly, when we consider the enormous extent of the literature that had to be mastered to produce a book embracing all the various theories of recent times, such an oversight is quite excusable.

and the result will be that its ancestors will be weakened still more. Inasmuch, now, as no weeding out of the weaker determinants of the hind leg by personal selection takes place on our hypothesis, inevitably the average strength of this determinant must slowly but constantly diminish, that is, the leg must grow smaller and smaller until finally it disappears altogether. The determinants¹ of the useless organ are constantly at a disadvantage as compared with the determinants of their environment in the germinal tene-ment, because no assistance is offered to them by personal selection after they have once been weakened by a decrease of the passive nutrient influx. Nor is the degeneration stopped by the uninterrupted crossing of individuals in sexual propagation, but only slightly retarded. The number of individuals with weaker determinants must, despite this fact, go on increasing from generation to generation, so that soon every determinant that still happens to be endowed with exceptional vigor will be confronted by a decided overplus of weaker determinants, and by continued crossing therefore will become more and more impoverished. Panmixia is the indispensable precondition of the whole process; for owing to the fact that persons with weak determinants are just as capable of life as those with strong, owing to the fact that they cannot now, as formerly, when the organ was still useful, be removed by personal selection, solely by this means is a further weakening effected in the following generations—in short, only by this means are the determinants of the useless organ brought upon the inclined plane, down which they are destined slowly but incessantly to slide towards their complete extinction.

The foregoing explanation will be probably accepted as satisfactory *in a purely formal regard*, but it will be objected that, even granting this, it has not yet been proved to be the correct one. In answer I can of course adduce nothing except that it is at present the only one that can be given. It may be that the actual state of

¹ I speak here of determinants, not of groups of determinants, which is the more correct expression, merely for the sake of brevity. It is a matter of course that a whole extremity, such as we have here chosen, cannot be represented in the germ by a single determinant only, but requires a large group of determinants.

things in nature is different, but if it can be shown that a self-direction of variation merely from the need of it is at all conceivable by mechanical means, that in itself, it seems to me, is a decided gain. It must also not be forgotten that some process or other *must* take place in the germ-plasm when an organ becomes rudimentary, and that as the result of it this organ, and only this organ, must disappear. Now in what shall this process consist, if not in a modification of the constitution of the germ? And how could the effect of such a modification be limited only to *one* organ which was becoming rudimentary, if the modification itself were not a local one? These are questions which it is incumbent on those to answer who conceive the germinal substance to be composed of like units.

Applying, now, the explanation derived from the disappearance of organs to the opposed transformation, namely, to the *enlargement* of a part, the presumption lies close at hand that the production of the long tail-feathers of the Japanese cock does not repose solely on the displacement directly effected by personal selection, of the zero-point of variation upwards, but that *it is also fostered and strengthened by germinal selection*. Were that not so, the phenomena of the transmutation of species, in so far as fresh growth and the enlargement and complication of organs already present are concerned, *would not be a whit more intelligible than they were before*. We should know probably how it comes to pass that the constitutional germinal elements (groups of determinants) of a *single* organ are intensified by selection, but the flood of objections against the theory of selection touching its inability to modify *many* parts at once would not be repressed by such knowledge. The initial impulse conditioning the independent maintenance of the useful direction of variation in the germ-plasm must rather be sought in the utility of the modification itself, and this also seems to me intelligible from the side of the theory. For as soon as personal selection favors the more powerful variations of a determinant, the moment that these come to predominate in the germ-plasm of the species, at once the tendency must arise for them to vary *still more strongly* in the plus direction, not solely because the zero-point has been pushed further upwards, but because they themselves now oppose a relatively more

powerful front to their neighbors, that is, actively absorb more nutriment, and upon the whole increase in vigor and produce more robust descendants. From the relative vigor or dynamic status of the particles of the germ-plasm, thus, will issue spontaneously an ascending line of variation, precisely as the facts of evolution require. For, as I have already said, it is not sufficient that the augmentation of a character should be brought about by uninterrupted personal selection, even supposing that the displacement of the zero-point were possible without germinal selection.

Thus, I think, may be explained how personal selection imparts the initial impulse to processes in the germ-plasm, which, when they are once set agoing, persist of themselves in the same direction, and are, therefore, in no need of the continued supplementary help of personal selection, *as directed exclusively to a definite part*. If but from time to time, that is, if upon the average the poorest individuals, the bearers of the weakest determinants, are eliminated, the variational direction of the part in question, now reposing on germinal selection, must persist, and it will very slowly but very surely increase until further development is impeded by its inutility and personal selection arrests the process, that is, ceases to eliminate the weaker individuals.

In this manner it becomes intelligible how a large number of modifications varying in kind and far more so in degree can be guided *simultaneously* by personal selection; how in strict conformity with its adaptive wants every part is modified, or preserved unmodified; how a given articulation can undergo modifications, causing it to disappear on one side, to grow in volume on another, and to continue unaltered on a third. For every part that is perfectly adapted, although it can fluctuate slightly, yet can never undergo a permanent alteration in the ascending or descending direction because every plus and every minus variation which has attained selective value would be eliminated by personal selection in the course of time. Therefore, a definite direction of variation cannot arise in such cases and we have also reached, as it seems to me, a satisfactory explanation of the *constancy* of well-adapted species and characters.

Hitherto I have spoken only of plus and minus variation. But there exist, as we know, not only variations of size but also variations of *kind*; and the coloration of the wings of butterflies, which we chose above as our example, would fall, according to the ordinary usage of speech, under just this head of variations of quality. The question arises, therefore, Have the principles just developed any claim to validity in the explanation of *qualitative* modifications?

In considering this question it should be carefully borne in mind that by far the largest part of the qualitative modifications falling under this head rest on *quantitative* changes. Of course, chemical transformations, which usually also involve quantitative alterations, cannot be reduced to the processes of augmentation described, inasmuch as these, by their very nature, can be effected only in living elements capable of increase by propagation; but the interference of selection does not begin originally with the "constitutional elements" (the *Anlagen*) of the germ, i. e. with the determinants, but with the ultimate units of life, the *biophores*.

A determinant must be composed of heterogeneous biophores, and on their numerical proportion reposes, according to our hypothesis, their specific nature. If that proportion is altered, so also is the character of the determinant. But disturbances of this numerical proportion must result at once on their usefulness being proved, or as soon as the modifications determined thereby in the inward character of the determinant prove to be of utility. For fluctuations of nutriment and the struggle for nutriment, with its sequent preference of the strongest, must take place between the various species of the biophores as well as between the species of the determinants. But changes in the quantitative ratios of the biophores appear to us qualitative changes in the corresponding determinants, somewhat as a simple augmentation of a determinant, for example, that of a hair, may, on its development appear to us as a qualitative change, a spot on the skin where previously only isolated hairs stood being now densely crowded with them, and assuming thus the character of a downy piece of fur. The single hair need not have changed in this process, and yet the spot has virtually undergone a qualitative modification. The majority of the

changes that appear to us qualitative rest on invisible *quantitative* changes, and such can be produced at all times and *at all stages of the vital units* by germinal selection. In a similar manner are induced the most varied qualitative changes of the corresponding determinants and of the characters conditioned thereby, just as changes in the numerical proportions of atoms produce essential changes in the properties of a chemical molecule.

In this way we acquire an approximate conception of the possible mechanical *modus operandi* of actual events—namely, of the manner in which the useful variations required by the conditions of life *can* always, that is, very frequently, make their appearance. This possibility is the sole condition of our being able to understand how different parts of the body, absolutely undefined in extent, can appear as variational units and vary in the same or in different directions, according to the special needs of the case, or as the conditions of life prescribe. Thus, for example, in the case of the butterfly's wings it rests entirely with utility to decide the size and the shape of the spots that shall vary simultaneously in the same direction. At one time the whole under surface of the wing appears as the variational unit and has the same color; at another the inside half, which is dark, is contrasted with the outside half which is bright; or the same contrast will exist between the anterior and posterior halves; or, finally, narrow stripes or line-shaped streaks will behave as variational units and form contrasts with manifold kinds of spots or with the broader intervals between them, with the result that the picture of a leaf or of another protected species is produced.

I must refrain from entering into the details of such cases and shall illustrate my views regarding the color-transformations of butterflies' wings by the simplest conceivable example—viz. that of the uniform change of color on the entire under surface of the wing.

Let us suppose, for example, that the ancestral species of a certain forest-butterfly habitually reposed on branches near the ground and covered with dry or rotten leaves; such a species will have assumed on its under surface a protective coloring which by its dark, brown, yellow, or red tints will tend towards a similarity with such leaves. If, however, the descendants of this species

should be subsequently compelled, no matter from what cause, to adopt the habit of resting higher up, on the green-leafed branches, then from that period on the brown coloring would act less protectively than the shades verging towards green. And a process of selection will have set in which consisted first in giving preference only to such persons whose brown and yellow tints showed a tendency to green. Only on the assumption that such shades were possible by a displacement in the quantitative proportions of the different kinds of biophores composing the determinants of the scales affected, was a further development in the direction of green possible. Such being the case, however, that development *had to* result ; because fluctuations in the numerical proportions of the biophores are always taking place, and consequently the material for germinal selection is always at hand. At present it is impossible to determine exactly the magnitude of the initial stages of the deviations thus brought about and promoted by the sexual blending of characters ; but it may perhaps be ascertained in the future, with exceptionally favorable material. Pending such special observations, however, it can only be said *a priori* that slight changes in the composition of a determinant do not necessarily condition similar slight deviations of the corresponding character,—in this case the color,—just as slight changes in the atomic composition of a molecule may result in bestowing upon the latter widely different properties. As soon, however, as the beginning has been made and a definite direction has been imparted to the variation, as the result of this or that primary variation being preferred, the selective process must continue until the highest degree of faithfulness required by the species in the imitation of fresh leaves has been attained.

That the foregoing process has actually taken place is evidenced not only by the presence of the beginnings of such transformations, as found for example in some greenish-tinted specimens of *Kallima*, but mainly by certain species of the South American genus *Catonephele*, all of which are forest-butterflies, and which, with many species having dark-brown under surfaces, present some also with bright green under surfaces—a green that is not like the fresh green

of our beech and oak trees, but resembles the bright under surface of the cherry-laurel leaf, and is the color of the under surfaces of the thick, leathery leaves, colored dark-green above, borne by many trees in the tropics.

The difference between this and the old conception of the selection-process consists not only in the fact that a large number of individuals with the initial stages of the desired variation is present from the beginning, for always innumerable plus and minus variations exist, but principally in the circumstance that the constant uninterrupted progress of the process after it is once begun is assured, that there can never be a lack of progressively advantageous variations in a large number of individuals. Selection, therefore, is now not compelled to wait for accidental variations but produces such itself, whenever the required elements for the purpose are present. Now, where it is a question simply of the enlargement or diminution of a part, or of a part of a part, these variations are always present, and in modifications of quality they are at least present in many cases.

This is the only way in which I can see a possibility of explaining phenomena of *mimicry*—the imitation of one species by another. The useful variations must be produced in the germ itself by internal selection-processes if this class of facts is to be rendered intelligible. I refer to the mimicry of an exempt species by two or three other species, or, the aping of *different* exempt patterns by *one* species in need of protection. It must be conceded to Darwin and Wallace that some degree of similarity between the copy and the imitation was present from the start, at least in very many cases;¹ but in no case would this have been sufficient had not slight shades of coloring afforded some hold for personal selection, and in this way furnished a basis for independent germinal selection acting

¹ That this is not so in all cases has recently been shown by Dixey from observations on certain white butterflies of South America which mimic the Heliconids and in which a small, yellowish red streak on the under surface of the hind wing has served as the point of departure and groundwork of the development of a protective resemblance to quite differently colored Heliconids. "On the Relation of Mimetic Characters to the Original Form," in the *Report of the British Association for 1894*.

only in the direction indicated. It would have been impossible for such a minute similarity in the design, and particularly in the shades of the coloration, ever to have arisen, if the process of adaptation rested entirely on personal selection. Were this so, a complete scale of the most varied shades of color must have been continually presented as variations in every species, which certainly is not the case. For example, when the exempt species *Acræa Egina*, whose coloration is a brick-red, a color common only in the genus *Acræa*, is mimicked by two other butterflies, a *Papilio* and a *Pseudacræa*, so deceptively that not only the cut of the wings and the pattern of their markings, but also that precise shade of brick-red, which is scarcely ever met with in diurnal butterflies, are produced, assuredly such a result cannot rest on accidental, but must be the outcome of a *definitely directed*, variation, produced by utility. We cannot assume that such a coloration has appeared as an *accidental* variation in just and in only these two species, which fly together with the *Acræa* in the same localities of the same country and same part of the world—the Gold Coast of Africa. It is conceivable, indeed, that non-directed variation should have accidentally produced this brick-red *in a single case*, but that it should have done so three times and in three species, which live together but are otherwise not related, is a far more violent and improbable assumption than that of a causal connexion of this coincidence. Now hundreds of cases of such mimicry exist in which the color-tints of the copy are met with again in more or less precise and sometimes in exceedingly exact imitations, and there are thousands of cases in which the color-tint of a bark, of a definite leaf, of a definite blossom, is repeated *exactly* in the protectively colored insect. In such cases there can be no question of accident, but *the variations presented to personal selection must themselves have been produced by the principle of the survival of the fit!* And this is effected, as I am inclined to believe, through such profound processes of selection in the interior of the germ-plasm as I have endeavored to sketch to you to-day under the title of germinal selection.

I am perfectly well aware how schematic my presentation of this process is, and must be at present, owing mainly to our inabil-

ity to gain exact knowledge concerning the fundamental germinal constituents here assumed. But I regard its existence as assured, although I by no means underrate the fact that eminent thinkers, like Herbert Spencer, contest its validity and believe they are warranted in assuming a germ which is composed of *similar units*. I strongly doubt whether even so much as a *formal* explanation of the phenomena can be arrived at in this manner. So far as direct observation is concerned, the two theories stand on an equal footing, for neither my dissimilar, nor Spencer's similar, units of germinal substance can be *seen* directly.

The attempt has been recently made to discredit my *Anlagen*, or constitutional germ-elements, on the ground that they are simply a subtilised reproduction of Bonnet's old theory of preformation.¹ This impression is very likely based upon ignorance of the real character of Bonnet's theory. I will not go into further details here, particularly as Whitman, in several excellently written and

¹Oscar Hertwig, *Zeit- und Streitfragen der Biologie*, Jena, 1894. It is customary now to look upon the preformation-theory of Bonnet as a discarded monstrosity, and on the epigenesis of K. F. Wolff as the only legitimate view, and to draw a parallel between these two and what might be called to-day "evolution" [i. e. unfoldment] and epigenesis. The evolution, or unfoldment, of Bonnet and Harvey, however, was something totally different from modern doctrines of evolution, and Whitman is quite right when he says that even my theory of determinants would have appeared to the inquirers of the last century as "extravagant epigenesis." Biologists in that day were concerned with quite different questions from what they are at present, and although now we probably all share the conviction of Wolff that new characters do arise in the course of evolution, yet the acceptance of this view is far from settling the question *as to how these new characters are established in the germ-substance*—for in this substance they certainly must have their foundation. When, therefore, O. Hertwig laments over my regarding evolution and not epigenesis as the correct foundation of the theory of development, his sorrow is almost as naïve as is the statement of Bourne that epigenesis is a fact and not a theory ("a statement of morphological fact," *Science Progress*, April, 1894, page 108), or, as is the latter's unconsciousness that facts originally receive their scientific significance from thought, i. e. from their interpretation and combination, and that thought *is* theory. And when S. Minot, as the leader of the embryologists, carries his zeal to the pitch of issuing a general pronunciamento against me as a seducer of the youth, in which he declares it to be a "scientific duty to protest in the most positive manner against Weismann's theory," I wonder greatly that he does not suggest the casting of a general ballot in the matter. (See the *Biologisches Centralblatt* of August 1, 1895.) We see how with these gentlemen the wisdom of the recitation-room regarding the infallibility of epigenesis has grown into a dogma, and whoever ventures to disturb its foundations must be burnt as a heretic.

finely conceived essays, has recently afforded opportunity for every one to inform himself on the subject. My determinants and groups of determinants have nothing to do with the preformations of Bonnet; in a sense they are the exact opposites of them; they are simply *those living parts of the germ whose presence determines the appearance of a definite organ of a definite character in the course of normal evolution*. In this form they appear to me to be an absolutely necessary and unavoidable inference from the facts. There *must* be contained in the germ parts that correspond to definite parts of the complete organism, that is, parts that constitute the reason why such other parts are formed.

It is conceded even by my opponents that the reason why one egg produces a chicken and another a duck is not to be sought in external conditions, but lies in a difference of the germinal substance. Nor can they deny that a difference of germinal substance must also constitute the reason why a slight *hereditary* difference should exist between two filial organisms. Should there now, in a possible instance, be present between them a second, a third, a fourth, or a hundredth difference of hereditary character, each of which could vary from the germ, then, certainly, some second, third, fourth, or hundredth part of the germ must have been different; for whence, otherwise, should the heredity of the differences be derived, seeing that external influences affecting the organism in the course of evolution induce only non-transmissible and transient deviations? But the fact that every complex organism is actually composed of a very large number of parts independently alterable from the germ, follows not only from the comparison of allied species, but also and principally from the experiments long conducted by man in artificial selection, and by the consequent and not infrequent change of only a single part which happens to claim his interest, for example, the tail-feathers of the cock, the fruit of the gooseberry, the color of a single feather or group of feathers, and so on. But a still more cogent proof is furnished by the degeneration of parts grown useless, for this process can be carried on to almost any extent without the rest of the body necessarily becoming involved in sympathetic alteration. Whole members may become rudimentary, like the hind limbs

of the whale, or it may be only single toes or parts of toes ; the whole wing may degenerate in the females of a butterfly species, or only a small circular group of wing-scales, in the place of which a so-called "window" arises. A single vein of the wing also can degenerate and disappear, or the process may affect only a part of it, and this may happen in one sex only of a species. In such cases the rest of the body may remain absolutely unaltered ; only a stone is taken out of the mosaic.

The assumption, thus, appears to me irresistible, that every such hereditary and likewise independent and very slight change of the body rests on some alteration of *a single* definite particle of the germinal substance, and not as Spencer and his followers would have it, on a change of *all* the units of the germ. If the germinal substance consisted wholly of like units, then in every change, were it only of a single character, *each* of these units would have to undergo exactly the same modification. Now I do not see how this is possible.

But it may be that Spencer's assumption is the *simpler* one ? Quite the contrary, its simplicity is merely apparent. Whilst my theory needs for each modification only a modification of *one* constitutional element of the germ, that is, of *one* particle of the germinal substance, according to Spencer *every* particle of that substance must change, for they are all supposed to be and to remain alike. But seeing that all hereditary differences, be they of individuals, races, or species, must be contained in the germ, the obligation rests on these similar units, or rather the capacity is required of them, to produce in themselves a truly enormous number of differences. But this is possible only provided their composition is an exceedingly complex one, or only on the condition that in every one of them are contained as many alterable particles as according to my view there are contained determinants in the whole germ. *The differences that I put into the whole germ, Spencer and his followers are obliged to put into every single unit of the germinal substance.* My position on this point appears to me incontrovertible so long as it is certain that the *single* characters can vary hereditarily; for, if a thing can vary independently, that is, *of its own accord, and from the germ,*

then that thing must be represented in the germ by some particle of the substance, *and be represented there in such wise that a change of the representative particle produces no other change in the organism developing from the germ than such as are connected with the part which depends on it.* I conceive that even on the assumption of constitutional elements the germ-plasm is complex enough, and that there is no need of increasing its complexity to a fabulous extent. Be that as it may, the person who fancies he can produce a complex organism from a *really* simple germinal substance is mistaken: he has not yet thoroughly pondered the problem. The so-called "epigenetic" theory with its *similar* germinal units is therefore naught else than an evolution-theory where the primary constitutional elements are set back into the molecules and atoms—a view which in my judgment is inadmissible. A *real* epigenesis from absolutely *homogeneous* and not merely *like* units is not thinkable.

All value has been denied my doctrine of determinants¹ on the ground that it only shifts the riddles of evolution to an invisible terrain where it is impossible for research to gain a foothold.

Now I have indeed to admit that no information can be gained concerning my determinants, either with the aided or with the unaided eye. But fortunately there exists in man another organ which may be of use in fathoming the riddles of nature and this organ which is called the brain has in times past often borne him out in the assumption of invisible entities—entities that have not always proved unfruitful for science by reason of that defect, in proof whereof we may instance the familiar assumptions of atoms and molecules. Probably the biophores also will be included under that head if the determinants should be adjudged utterly unproductive. But so far I have always held that assumptions of this kind *are* really productive if they are only capable of being used, so to speak, as a *formula*, whereby to perform our computations, unconcerned for the time being as to what shall be its subsequent fate. Now, as I take it, the determinants have had fruitful results, as their application to various biological problems shows. Is it no advance that we are able to re-

¹ Oscar Hertwig, *Zeit- und Streitfragen der Biologie*, Jena, 1894.

duce the scission of a form of life into two or several forms subject to separately continued but recurrent changes,—I refer to dimorphism and polymorphism,—that we are able to reduce such phenomena to the formula of male, female, and worker determinants? It has been, I think, rendered conceivable how these diverse and extremely minute adaptations could have developed side by side in the same germ-plasm, under the guidance of selection; how sterile forms could be *hereditarily* established and transformed in just that manner which best suits with their special duties; and how they themselves under the right circumstances could subsequently split up into two or even into three new forms. Surely at least the unclear conception of an *adaptively* transformative influence of food must be discarded. It is true, we cannot penetrate by this hypothesis to the last root of the phenomena. The hotspurs of biology, who clamor to know forthwith how the molecules behave, will scarcely repress their dissatisfaction¹ with such provisional knowledge—forgetful that *all our knowledge is and remains throughout provisional*.

But I shall not enter more minutely into the question whether epigenesis or evolution is the right foundation of the theory of development, but shall content myself with having shown, first, that it is illusory to imagine that epigenesis admits of a simpler structure of the germ, (the precise opposite is true,) and secondly, that there are phenomena that can be understood only by an evolution-theory. Such a phenomenon is the *guidance of variation by utility*, which we have considered to-day. For without primary constituents of the germ, whether they are called as I call them, determinants, or something else, *germinal selection*, or guidance of variation by personal selection, is impossible; for where all units are alike there can be

¹Nor will those, who demand a demonstration of "how the biophores and determinants are constituted in every case, and must be arranged in the architecture of the germ-plasm." (O. Hertwig, *loc. cit.*, p. 137). As if any living being could have the temerity to pretend even so much as to guess at the *actual* ultimate phenomena in evolution and heredity! The whole question is a matter of symbols only, just as it is in the matter of "forces," "atoms," "ether undulations," etc., the only difference being that in biology we stumble much earlier upon the unknown than in physics.

no struggle, no preference of the best. And yet such a guidance of variation exists and demands its explanation, and the early assumptions of a "definitely directed variation" such as Nägeli and Askenasy made are insufficient, for the reason that they posit only *internal* forces as the foundations thereof, and because, as I have attempted to show, the harmony of the direction of variation with the requirements of the conditions of life subsists and represents the riddle to be solved. *The degree of adaptiveness which a part possesses itself evokes the direction of variation of that part.*

This proposition seems to me to round off the whole theory of selection and to give to it that degree of inner perfection and completeness which is necessary to protect it against the many doubts which have gathered around it on all sides like so many lowering thunder-clouds. The moment variation is determined substantially though not exclusively by the adaptiveness itself, all these doubts fall to the ground, with *one* exception, that of the utility of the initial steps. But just this objection is the least weighty. Without doubt the theory requires that the initial steps of a variation should also have selective value; otherwise personal selection and hence germinal selection could not set in. Since, however, as I have before pointed out, *in no case can we pretend to a judgment regarding the selective value of a modification, or have any experience thereof*, therefore the assumption that in a given case where a character is transformed the original initial steps of the variation did have selective value, is not only as probable as the opposed assumption that they had none, but is *infinitely more probable*, for with this we can give an intelligible explanation of the mysterious fact of adaptation, while with that we cannot. Consequently, unless we are resolved to give up all attempts whatsoever at explanation, we are forced to the assumption that the initial steps of all actually effected adaptations possessed selective value.

The principal and fundamental objection that selection is unable to create the variations with which it works, is removed by the apprehension that a germinal selection exists. Natural selection is not compelled to wait until "chance" presents the favorable variations, but supposing merely that the groundwork for favorable variations is

present in the transforming species, that is, supposing merely that in the constitutional basis of the part to be changed are contained components which render favorable variations possible by a change of their numerical ratio, then those variations *must* occur, for the reason that quantitative fluctuations are always happening, and they must also be augmented as soon as personal selection intervenes and permanently holds over them her protecting hand. Not only is the marvellous *certainty and exactitude* with which adaptation has operated in so many individual cases, rendered intelligible in this manner, but what is more difficult, we are able to understand the *simultaneity* of numerous and totally different modifications of the most diverse parts co-operant towards some collective end, such as we see so frequently occur, for example, in the simultaneous rise of instincts and protective similarities, or, in the harmonious and simultaneous augmentation of two co-operant but independent organs, as of the eye and of the centre of vision, or of the nerve and its muscle, etc.

The "secret law," of which Wolff prophetically speaks in his criticism of selection, is in all likelihood naught else than germinal selection. This it is that brings it about that the necessary variations are always present, that symmetrical parts, for example, the two eyes, usually vary alike, but under circumstances may vary differently, for example, the two visual halves of soles; that homodynamic parts, (for instance, the member-pairs of Arthropoda,) have frequently varied alike, and not infrequently and in conformity with the needs of the animal, have varied differently. It brings it about also that conversely species of quite different fundamental constitutions occasionally vary alike, as instances of mimicry and numerous other cases of convergence show us. As soon as utility itself is supposed to exercise a determinative influence on the direction of variation, we get an insight into the entire process and into much else besides that has hitherto been regarded as a stumbling-block to the theory of selection, and which did indeed present difficulties which for the moment were insuperable—as, for example, the like-directed variation of a large number of already existing similar parts, seen in the origin of feathers from the scales of reptiles. The

utility in the last-mentioned instance consisted, not in the transformation of one or of two, but of *all* the scales; consequently the line of variation of *all* the scales must have been started simultaneously in the same direction. A large part of the objections to the theory of selection that have been recently brought forward by the acutest critics, as for example by Wigand, but particularly by Wolff,¹ find, as I believe, their refutation in this doctrine of germinal selection. The principle extends precisely as far as utility extends, inasmuch as it creates, not only the direction of variation for every increase or diminution demanded by the circumstances, but also every qualitative direction of variation attainable by changes of quantity, so far as that is at all possible for the organism in question.

Considering also the contrary process, the degeneration of useless parts by the cessation of selection in regard to the normal size of that part, a clear light is shed on that whole complex system of ascending and descending modifications which makes up most of the transformations of a living form, and we are led to understand how the *fore* extremity of a mammal can change into a fin at the same time that the *hinder* extremity is growing rudimentary, or how one or two toes of a hoofed animal can continue to develop more and more powerfully, whilst the others in the same degree grow weaker and weaker until finally they have disappeared entirely from the germ of most of the individuals of the species.

Possibly some of that large body of inquirers, mostly paleontologists, who till now have considered the Lamarckian principle indispensable for the explanation of these phenomena—perhaps some, I say, will not utterly close their eyes to the insight that germinal selection performs the same services for the understanding of observed transformations, particularly of the degeneration of superfluous parts, that a heredity of acquired characters would perform, without rendering necessary so violent an assumption. I have always conceded that many transformations actually do run parallel

¹ "Beiträge zur Kritik der Darwin'schen Lehre," *Biologisches Centralblatt*, Vol. X., p. 449. 1890.

to the use and disuse of the parts,¹ that therefore it does really look as if functional acquisitions of the individual life were hereditary. But if it be found that *passively functioning parts*, that is, parts which are not alterable during the individual life by function, obey the same laws and also degenerate when they become useless, then we shall scarcely be able to refuse our assent to a view which explains both cases. It certainly cannot be the physiological function which provokes modifications in the individual, which are then subsequently transmitted to the germ and in this way made hereditary, *if functionless parts also change* when they become useless. It is precisely this *uselessness*, then, from which the initial impulse emanates, and the primary modification is not in the soma but in the germ.

The Lamarckians were right when they maintained that the factor for which hitherto the name of natural selection had been exclusively reserved, viz., *personal* selection, was insufficient for the explanation of the phenomena. They were also right when they declared that panmixia in the form in which until recently I held the theory was also insufficient to explain the degeneration of parts that had grown useless, but they erred when they ascribed hereditary effects to the selection-processes which are enacted among the parts of the body (Wilhelm Roux) and which are rightly regarded as the results of functioning. And they did this, moreover, as they themselves admit, not because the facts of heredity directly and unmistakably required it, but because they saw no other possibility of explaining many phenomena of transformation. I am fain to relinquish myself to the hope that now after another explanation has been found, a reconciliation and unification of the hostile views is not so very distant, and that then, we can continue our work together on the newly laid foundations.

That the application of the Malthusian principle was thoroughly justified is now clear. *The entire process of the development of living*

¹ Poulton has adverted to the fact that this is nevertheless not always the case; for example, it is not so with the teeth, whose shape it had also been sought to reduce to the mechanical effects of pressure and friction. See "The Theory of Selection" in *The Proceedings of the Boston Society of Natural History*, Vol. XX., page 389. 1894.

forms is guided by this principle. The struggle for existence, *videlicet*, for food and propagation, takes place at all the stages of life between all orders of living units from the biophores recently disclosed upwards to the elements that are accessible to direct observation, to the cells, and still higher up, to individuals and colonies. Consequently, in all the divers orders of biological units lying between the two extremes of biophores and colonies, the modifications must be controlled by selective processes; therefore, these govern every change of living forms no matter what its significance, and bring it about that the latter fit their conditions of life as wax does the mould; and the various stages of these processes, as enacted between the divers orders of biological units, in all organisms not absolutely simple, are involved in incessant and mutual interaction. The three principal stages of selection, that of *personal* selection¹ as it was enunciated by Darwin and Wallace, that of *histonal* selection as it was established by Wilhelm Roux in the form of a "struggle of the parts," and finally that of *germinal selection* whose existence and efficacy I have endeavored to substantiate in this article—these are the factors that have co-operated to maintain the forms of life in a constant state of viability and to adapt them to their conditions of life, now modifying them *pari passu* with their environment, and now maintaining them on the stage attained, when that environment is not altered.

Everything is adapted in animate nature² and has been from

¹ As the highest stage of selective processes must be regarded that between the highest biological units, the colonies or cormi—a stage, however, which is not essentially different from personal selection. In this stage the persons enact the part that the organs play in personal selection. Like their prototypes they also battle with one another for food and in this way maintain harmony in the colony. But the result of the struggle endures only during the life of the individual colony and can be transmitted through the germ-cells to the following generation as little as can histological changes provoked by use in the individual person. Only that which issues from the germ has duration.

² This statement has often been declared extravagant, and it is so if it is taken in its strict literalness. On the other hand, it would also seem, by a more liberal interpretation, as if there existed non-adaptive characters, for example, rudimentary organs. Adaptiveness, however, is never absolute but always conditioned, that is, is never greater than outward and inward circumstances permit. Moreover, an organ can only disappear gradually and slowly when it has become superfluous;

the first beginnings of life ; for adaptiveness of organisation is here equivalent to the power to exist, and they alone have had the power to exist who have permanently existed. *We know of only one natural principle of explanation for this fact—that of selection, of the picking out of those having the power to exist from those having the power to originate.* If there is any solution possible to the riddle of adaptiveness to ends,—a riddle held by former generations to be insoluble,—it can be obtained only through the assistance of this principle of the self-regulation of the originating organisms, and we should not turn our faces and flee at the sight of the first difficulties that meet its application, but should look to it whether the apparent effects of this single principle of explanation are not founded in the imperfect application that is made of it.

If I am not mistaken the situation is as follows. We had remained standing half way. We had applied the principle, but only to a portion of the natural units engaged in struggle. If we apply the principle throughout we reach a satisfactory explanation. Selection of *persons* alone is *not sufficient* to explain the phenomena ; *germinal* selection must be added. Germinal selection is the last consequence of the application of the principle of Malthus to living nature. It is true it leads us into a terrain which cannot be submitted directly to observation by means of our organs of touch and by our eyes, but it shares this disadvantage in common with all other ultimate inferences in natural science, even in the domain of inorganic nature : in the end all of them lead us into hypothetical regions. If we are not disposed to follow here nothing remains but to abandon utterly the hope of explaining the adaptive character of life—a renunciation which is not likely to gain our approval when we reflect that by the other method is actually offered at least in principle, not only a broad insight into the adaptation of the single forms of life to their conditions, but also into the mode of formation

yet this does not prevent our recognising every stage of its degeneration as adapted when compared with its precursor. Further, it does not militate against the correctness of the above proposition that there are also characters whose fitness consists in their being the necessary accompaniments of other directly adapted features, as, for instance, the red color of the blood.

of the living world as a whole. The variety of the organised world, its transformation by adaptation to new, and by reversed adaptation to old conditions, the inequality of the systematic groups, the attainment of the same ends by different means, that is, by different organisations, and a thousand and one other things assume on this hypothesis in a certain measure an intelligible form, whilst without it they remain lifeless facts.

And so in this case, I may say, that again doubt is the parent of all progress. For the idea of germinal selection has its roots in the necessity of putting something else in the place of the Lamarckian principle, after that had been recognised as inadequate. That principle did, indeed, seem to offer an easy explanation of many phenomena, but others stood in open contradiction to it, and consequently that was the point at which the lever had to be applied if we were to penetrate deeper into the phenomena in question. For it is at the places where previous views are at variance with facts that the divining rod of the well-seekers must thrice nod. There lie the hidden waters of knowledge, and they will leap forth as from an artesian well if he who bores will only drive undaunted his drill into their depths.

AUGUST WEISMANN.

FREIBURG i. B.

ON THE NATURE OF MATHEMATICAL KNOWLEDGE.

“**M**ATHEMATICALLY certain and indubitable” is a phrase which is often heard in the sciences and in common life, to express the idea that the seal of truth is more deeply imprinted upon a proposition than is the case with ordinary acts of knowledge. We propose to investigate here to what extent mathematical knowledge really is more certain and unequivocal than other knowledge.

The intrinsic character of mathematical research and knowledge is based essentially on three properties: first, on its conservative attitude towards the old truths and discoveries of mathematics; secondly, on its progressive mode of development, due to the incessant acquisition of new knowledge on the basis of old knowledge; and thirdly, on its self-sufficiency and its consequent absolute independence.

That mathematics is the most conservative of all the sciences is apparent from the incontestability of its propositions. This last character bestows on mathematics the enviable superiority that no new development can undo the work of previous developments or substitute new in the place of old results. The discoveries that Pythagoras, Archimedes, and Apollonius made are as valid to-day as they were two thousand years ago. This is a trait which no other science possesses. The notions of previous centuries regarding the nature of heat have been disproved. Goethe's theory of colors is now antiquated. The theory of the binary combination of salts was supplanted by the theory of substitution, and this, in its turn, has also given way to newer conceptions. Think of the pro-

found changes which the conceptions of theoretical medicine, zoölogy, botany, mineralogy, and geology have undergone. It is the same, too, in the other sciences. In philology, comparative linguistics, and history our ideas are quite different from what they formerly were.

In no other science is it so indispensable a condition that whatever is asserted must be true, as it is in mathematics. Whenever, therefore, a controversy arises in mathematics, the issue is not whether a thing is true or not, but whether the proof might not be conducted more simply in some other way, or whether the proposition demonstrated is sufficiently important for the advancement of the science as to deserve especial enunciation and emphasis, or finally, whether the proposition is not a special case of some other and more general truth which is just as easily discovered.

Let me recall the controversy which has been waged in this century regarding the eleventh axiom of Euclid, that only one line can be drawn through a point parallel to another straight line. This discussion impugned in no wise the truth of the proposition; for that things are true in mathematics is so much a matter of course that on this point it is impossible for a controversy to arise. The discussion merely touched the question whether the axiom was capable of demonstration solely by means of the other propositions, or whether it was not a special property, apprehensible only by sense-experience, of that space of three dimensions in which the organic world has been produced and which therefore is of all others alone within the reach of our powers of representation. The truth of the last supposition affects in no respect the correctness of the axiom but simply assigns to it, in an epistemological regard, a different status from what it would have if it were demonstrable, as was one time thought, without the aid of the senses, and solely by the other propositions of mathematics.

I may recall also a second controversy which arose a few decades ago as to whether all continuous functions were differentiable. In the outcome, continuous functions were defined that possessed no differential coefficient, and it was thus learned that certain truths which were enunciated unconditionally by Newton, Leibnitz, and

their mathematical successors, required qualification. But this did not invalidate at all the correctness of the method of differentiation and its application in all practical cases; the theoretical speculations pursued on this subject simply clarified ideas and sifted out the conditions upon which differentiability depended. Happily the gifted minds who create the new methods and open up the new paths of research in mathematics, are not deterred by the fear that a subsequent generation gifted with unusual acumen will spy out isolated cases in which their methods fail. Happily the creators of the differential calculus pushed onward without a thought that a critical posterity would discover exceptions to their results. In every great advance that mathematics makes, the clarification and scrutinisation of the results reached are reserved necessarily for a subsequent time, but with it the demonstration of those results is more rigorously established. Despite all this, however, in no science does cognition bear so unmistakably the imprint of truth as in pure mathematics. And this fact bestows on mathematics its conservative character.

This conservative character again is displayed in the *objects* of mathematical research. The physician, the historian, the geographer, and the philologist have to-day quite different fields of investigation from what they had centuries ago. In mathematics, too, every new age gives birth to new problems, arising partly from the advance of the science itself, and partly also from the advance of civilisation, where improvements in the other sciences bring in their train the formulation of problems that are constantly taxing anew the resources of mathematics. But despite all this, in mathematics more than in any other science problems exist that have played a rôle for hundreds, nay, for thousands of years.

In the oldest mathematical manuscript which we possess, the Papyrus Rhind of the British Museum, which dates back to the eighteenth century before Christ, and whose decipherment we owe to the industry of Eisenlohr, we find an attempt to solve the problem of converting a circle into a square of equal area, a problem whose history covers a period of three and a half thousand years. For it was not until 1882 that a rigorous proof was given of the im-

possibility of solving this problem exactly by the use of compasses and ruler alone.

It is, of course, the insoluble problems that have the longest history; partly because it is harder to show that a thing is impossible than that it is possible, and, on the other hand, because problems that have long defied solution are ever evoking anew the spirit of inquiry and the ambition of mathematicians, and because the uncertainty of insolubility lends to such problems a peculiar charm. Of the geometrical problems that have occupied competent and incompetent minds from the time of the ancient Greeks to the present may be mentioned in addition to the squaring of the circle two others that are also perhaps well-known to educated readers, at least by name: the trisection of the angle and the Delic problem of the duplication of the cube. All three problems involve the condition, which is often overlooked by unprofessional readers, that only compasses and ruler shall be employed in the constructions. In the trisection of the angle any angle is assigned, and it is required to find the two straight lines which divide the angle into three equal parts. In the Delic problem the edge of a cube is given and the edge of a second cube is sought, containing twice the volume of the first cube. In Greece, in the golden age of the sciences, when all scholars had to understand mathematics, it was a fashionable requisite almost to have employed oneself on these famous problems.

Fortunately for us, these problems were insoluble. For in their ambition to conquer them it came to pass that men busied themselves more and more with geometry, and in this way kept constantly discovering new truths and developing new theories, all of which perhaps might never have been done if the problems had been soluble and had early received their solutions. Thus is the struggle after truth often more fruitful than the actual discovery of truth. So, too, although in a slightly different sense, the apophthegm of Lessing is confirmed here, that the search for truth is to be preferred to its possession.

Whilst the three above-named problems are now acknowledged to be insoluble, and have ceased, therefore, to stimulate mathematical inquiry, there are of course other problems in mathematics

whose solution has been sought for a long time, but not yet reached, and in the case of which there is no reason for supposing that they are insoluble. Of such problems the two following perhaps have found their way out of the isolated circles of mathematicians and have become more or less known to other scholars. I refer to the astronomical Problem of Three Bodies and to the problem of the frequency of prime numbers. The first of these two problems assumes three or more heavenly bodies whose movements are mutually influenced by one another according to Newton's law of gravitation, and requires the exact determination of the path which each body describes. The second problem requires the construction of a formula which shall tell how many prime numbers there are below a certain given number. So far these two problems have been solved only approximately, and not with absolute mathematical exactness.

If the eternal and inviolable correctness of its truths lends to mathematical research, and therefore also to mathematical knowledge, a *conservative* character, on the other hand, by the continuous outgrowth of new truths and methods from the old, *progressiveness* is also one of its characteristics. In marvellous profusion old knowledge is augmented by new, which has the old as its necessary condition, and, therefore, could not have arisen had not the old preceded it. The indestructibility of the edifice of mathematics renders it possible that the work can be carried to ever loftier and loftier heights without fear that the highest stories shall be less solid and safe than the foundations, which are the axioms, or the lower stories, which are the elementary propositions. But it is necessary for this that all the stones should be *properly fitted together*; and it would be idle labor to attempt to lay a stone that belonged above in a place below. A good example of a stone of this character belonging in what is now the uppermost layer of the edifice, is Lindemann's demonstration of the insolubility of the quadrature of the circle, a demonstration of which interesting simplifications have been given by several mathematicians, including Weierstrass and Felix Klein. Lindemann's demonstration could not have been produced in the preceding century, because it rests necessarily on theories whose development falls in the present century. It is true,

Lambert succeeded in 1761 in demonstrating the irrationality of the ratio of the circumference of a circle to its diameter, or, which is the same thing, the irrationality of the ratio of the area of a circle to the area of the square on its radius. Afterwards, Lambert also supplied a proof that it was impossible for this ratio to be the square root of a rational number. But this was the first step only in a long journey. The attempt to prove that the old problem is insoluble was still destined to fail. An astounding mass of mathematical investigations were necessary before the demonstration could be successfully accomplished.

As we see, the majority of the mathematical truths now possessed by us presuppose the intellectual toil of many centuries. A mathematician, therefore, who wishes to-day to acquire a thorough understanding of modern research in this department, must think over again in quickened tempo the mathematical labor of several centuries. This constant dependence of new results on old ones stamps mathematics as a science of uncommon exclusiveness and renders it mostly impossible to open up to uninitiated readers a speedy path to the apprehension of the higher mathematical truths. For this reason, too, the theories and results of mathematics are rarely adapted for popular presentation. There is no royal road to the knowledge of mathematics, as Euclid once said to the first Egyptian Ptolemy. This same inaccessibility of mathematics, although it secures for it a lofty and aristocratic place among the sciences, also renders it odious to those who have never learned it, and who dread the great labor involved in acquiring an understanding of the questions of modern mathematics. Neither in the languages nor in the natural sciences are the investigations and results so closely interdependent as to make it impossible to acquaint the uninitiated student with single branches or with particular results of these sciences, without causing him to go through a long course of preliminary study.

The third trait which distinguishes mathematical research is its self-sufficiency. In philology the field of inquiry is the organic one of languages, and philology, therefore, is dependent in its investigations on the mode of development of languages, which is more or

less accidental. Its task is connected with something which is given to it from without and which it cannot alter. It is much the same with the science of history, which must contemplate the history of mankind as it has actually occurred. Also zoölogy, botany, mineralogy, geology, and chemistry work with given data. In order not to become involved in futile speculations the last-mentioned sciences are constantly and inevitably obliged to revert to observations by the senses. It is then their task to link together these individual observations by bonds of causality and in this way to erect from the single stones an edifice, the view of which will render it easier for limited human intelligence to comprehend nature. Physics of all sciences stands nearest to mathematics in this respect, because unlike the other sciences she is generally in need of only a few observations in order to proceed deductively. But physics, too, must resort to observations of nature, and could not do without them for any length of time.

Mathematics alone, after certain premises have been permanently established, is able to pursue its course of development independently and unmindful of things outside of it. It can leave entirely unnoticed, questions and influences emanating from the outer world, and continue nevertheless its development.

As regards geometry, the first beginnings of this science did indeed take their origin in the requirements of practical life. But it was not long before it freed itself from the restrictions of the practical art to which it owed its birth. Herodotus recounts that geometry had its origin in Egypt where the inundations of the Nile obliterated the boundaries of the riparian estates, and by giving rise to frequent disputes constantly compelled the inhabitants to compare the areas of fields of different shapes. But with the early Greek mathematicians, who were the heirs of the Egyptian art of measurement, geometry appeared as a science which men pursued for its own sake without a thought of how their intellectual discoveries could be turned to practical account.

Nevertheless, although the workers in the domain of pure mathematics are not stimulated by the thought that their researches are likely to be of practical value, yet that result is still frequently real-

ised, often after the lapse of centuries. The history of mathematics shows numerous instances of mathematical results which were originally the outcome of a mere desire to extend the science, suddenly receiving in astronomy, mechanics, or in physics practical applications which their originators could never have dreamt of. Thus Apollonius erected in ancient times the stately edifice of the properties of conic sections, without having any idea that the planets moved about the sun in conic sections, and that a Kepler and a Newton were one day to come who should apply these properties to explaining and calculating the motions of the planets about the sun. The question of the practical availability of its results in other fields has at no period exercised more than a subordinate influence on mathematical inquiry. Particularly is this true of *modern* mathematical research, whether the same consist in the extended development of isolated theories or in the uniting under a higher point of view of theories heretofore regarded as different.¹

This independence of its character has rendered the results of pure mathematics independent also of the accidental direction which the development of civilisation has taken on our planet; so that the remark is not altogether without justification, that if beings endowed with intelligence existed on other planets, the truths of mathematics would afford the only basis of an understanding with them. Uninterruptedly and wholly from its own resources mathematics has built itself up. It is scarcely credible to a person not versed in the science, that mathematicians can derive satisfaction from the comfortless and wearisome operation of heaping up demonstration on demonstration, of rivetting truth on truth, and of tormenting themselves with self-imposed problems, whose solution stands no one in stead, and affords satisfaction to no one but the solver himself. Yet this self-sufficiency of mathematicians becomes a little more intelligible when we reflect that the progress which has been made, particularly in the last few decades, and which is uninfluenced from without, does not consist solely in the accumulation of new truths

¹Cf. Felix Klein, "Remarks Given at the Opening of the Mathematical and Astronomical Congress at Chicago." *The Monist* (Vol. IV, No. 1, October, 1893).

and in the enunciation of new problems, nor solely in deductions and solutions, but culminates rather in the discovery of new methods and points of view in which the old disconnected and isolated results appear suddenly in a new connexion or as different interpretations of a common fundamental truth, or finally, as a single organic whole.

Thus, for example, the idea of representing imaginary and complex numbers in a plane, two apparently different branches, the theory of dividing the circumference of a circle into any given number of equal parts, and the theory of the solutions of the equation $x^n = 1$, have been made to exhibit an extremely simple connexion with one another which enables us to express many a truth of algebra in a corresponding truth of geometry and *vice versa*. Another example is afforded by the discovery which we chiefly owe to Alfred Clebsch, of the relation which subsists between the higher theory of functions and the theory of algebraic curves, a relation which led to the discovery of the condition under which two curves can be co-ordinated to each other, point for point, and hence also adequately represented on each other. Of course such combinations and extensions of view possess a much greater charm for the mathematician than the mere accumulation of truths and solutions, whose fascination consists entirely in their truth or correctness.

From these three cardinal characteristics, now, which distinguish mathematical *research* from research in other fields, we may gather at once the three positive characteristics that distinguish mathematical *knowledge* from other knowledge. They may be briefly expressed as follows; first, mathematical knowledge bears more distinctly the imprint of truth on all its results than any other kind of knowledge; secondly, it is always a sure preliminary step to the attainment of other correct knowledge; thirdly, it has no need of other knowledge. Naturally, however, there are associated with these characteristics which place mathematical knowledge high above all other knowledge, other characteristics which somewhat counterbalance the great superiority which mathematics thus appears to have over the other sciences. In order to show more distinctly the nature of these characteristics, which we prefer to call

negative, we shall select and confine our remarks to a branch which is commonly taken to be synonymous with mathematics, namely, to arithmetic in the broadest sense of the word.

The subject of inquiry in arithmetic is numbers and their combinations. On this account arithmetic is, of all sciences, most free from what lies outside its boundaries. Perception by the senses is necessary only in an extremely insignificant measure for the understanding of its definitions and premises. It is possible to acquaint a person who lacks both sight and hearing with the fundamental principles of arithmetic solely by the medium of "time." Such a person needs only the sense of feeling. By slight excitations of his skin, induced at equal or unequal intervals of time, he can be led to the notion of differences of time and hence also to the notion of differences of number. Uninfluenced by matter and force, independently, too, of the properties of geometrical magnitudes, arithmetic could be conducted solely by its own intrinsic potencies to its high goals, drawing deductively truth from truth, without a break.

But what sort of a science should we arrive at by this method of procedure? Nothing but a gigantic web of self-evident truths. For, once we admit the first notions and premises to which a man thus bereft of his senses can be led, we are compelled of necessity also to admit the derivative results of arithmetic. If the beginnings of arithmetic appear self-evident, the rest of it, too, bears this character. Owing to this deductive character of arithmetic, and to its exemption from influence from without, this science appears to one person extremely attractive, while to another it appears extremely repulsive, according as each is constituted. Be that as it may, however, a finished and complete science of this character subserves no purpose in the comprehension of the world, or in the advancement of civilisation. Hence, an arithmetic which heaps up theorem on theorem with never a thought of how its results are to be turned to practical account in the acquisition of knowledge in other fields, resembles an inquisitive physician, who, taking up his abode in a desert, should arrive there at momentous results in bacteriology, but should bear them with him to his grave, without their ever redounding to the benefit of humanity. The value of

arithmetical knowledge lies entirely in its applications. But this constitutes no reason why many mathematicians, pursuing their purely deductive bent of mind, should not devote themselves exclusively to pure arithmetical developments and leave it to others at the proper time to turn to the material profit of the world the capital which they have garnered.

Geometry, on the other hand, must have recourse in a much higher degree than arithmetic to the outside world for its first notions and premises. The axioms of geometry are nothing but facts of experience perceived by our senses. The geometry which Bolyai, Lobatchewsky, Gauss, Riemann, and Helmholtz created and which is both independent of the eleventh axiom of Euclid and perfectly free from self-contradictions, has supplied an epistemological demonstration that geometry is a science that rests on the observation of nature, and therefore in the correct sense of the word, is a natural science.

Yet what a difference there is, for instance, between geometry and chemistry. Both derive their constructive materials from sense-perception. But whilst geometry is compelled to draw only its first results from observation and is then in a position to move forward deductively to other results without being under the necessity of making fresh observations, chemistry on the other hand is still compelled to make observations and to have recourse to nature.

It follows, therefore, that a given act of geometrical knowledge and a given act of chemical knowledge are with respect to the certainty of the truth they contain not qualitatively but only quantitatively different. In chemistry the probability of error is greater than in geometry, because more numerous and more difficult observations have to be made there than in geometry, where only the very first premises, which no man with sound senses could ever impugn, rest on observation.

The preceding reflexions deprive mathematical knowledge of that degree of certainty and incontestability which is commonly attributed to it when we say a thing is "mathematically certain." This certainty is lessened still more as we pass to the semi-mathematical sciences, where mechanics has the first claim to our at-

tention. All the notions of mechanics, and consequently of all the other departments of physics, are composed, by multiplication or division, of three fundamental notions—length, time, and mass. That is to say, to the notions of geometry resting on length and its powers, two other fundamental notions, time and mass, are added, which, joined to that of length, lead to the notions of force, work, horse-power, atmospheric pressure, etc. The knowledge of mechanics, thus, highly certain though it be, is rendered less certain than that of geometry and *a fortiori* than that of arithmetic. The uncertainty of knowledge continues to increase in branches which are still more remote from mathematics, owing to the increasing complexity of the observational material which must here be put to the test.

Still, although mathematical knowledge does not lead to absolutely certain results, it yet invests known results with incomparably greater trustworthiness than does the knowledge of the other sciences. But after all, it remains a useless accumulation of capital so long as it is not turned to practical account in other sciences, such as metaphysics, physics, chemistry, biology, political economy, etc. Hence also arises an obligation on the part of the other sciences, so to shape their problems and investigations that they can be made susceptible of mathematical treatment. Then will mathematics gladly perform her duty. The moment a science has advanced far enough to permit of the mathematical formulation of its problems, mathematics will not be slow to treat and to solve these problems. Mathematical knowledge, aristocratic as it may appear by the greater certainty of its results, will, so far as the advancement of human kind is concerned, never be more than a useless mass of self-evident truths, unless it constantly places itself in the service of the other sciences.

H. SCHUBERT.

HAMBURG.

BOOK REVIEWS.

POST-DARWINIAN QUESTIONS, HEREDITY AND UTILITY. Part II. of *Darwin, and After Darwin*. By the late *George John Romanes, M. A., LL. D., F. R. S.* Chicago: The Open Court Publishing Company. 1895. Pages, 344. Price, \$1.50.

The second part of the admirable work, *Darwin, and After Darwin*, has been long anticipated with its promise of a clear expression of Mr. Romanes's views upon the most vital problems of contemporary evolution.

The preparation of Part II. was frequently interrupted by the author's illness and was suddenly terminated by his untimely death. It now finally appears with the able editorial supervision of Prof. C. Lloyd Morgan. Although written under many difficulties, Mr. Romanes's best qualities shine forth in this volume,—his absolute independence of opinion, his clear, critical faculty, his earnest desire to arrive only at the truth. None of his English contemporaries have shown the two former qualities in so marked a degree, excepting perhaps his own editor. At the outset the introductory chapter upon the Darwinism of Darwin and of the Post-Darwinian schools sets forth in a more lucid manner than has been seen before the differences of the newer "Schools." These differences shade into each other as gradually as the colors of the spectrum when we pass from the Anti-Selectionists (Sachs, Pfeffer, and Henslow), Neo-Lamarckians (Spencer, Cope, Eimer), Darwinians (Romanes, Galton), Neo-Darwinians (Wallace, Poulton), to the Weismannians. Considering the tenets of these Schools in the above order, we observe that the factors of self-adaptation, definite variation and evolution guided by inheritance, fall from their maximum to their minimum while the factors of evolution guided by fortuitous variation and natural selection rise from their minimum to their maximum. Thus the two extremes of *law* and of *fortuity* respectively as the basal phenomena of evolution are diametrically opposed.

We feel that a fine, clear mind has shaped this and the succeeding chapters, but not a master mind. We feel the lack of a high order of originality and the failure to grasp the significance of all the evidence now available from physiology, botany, zoölogy, and palæontology. Apparently, no man of our time has the genius to marshal in their proper order the countless discordant facts from these four

quarters of biological research and fully state the problem which is now far broader than that which faced Darwin. We are glad to add as a tribute to our late lamented author that his vision has been clearer and broader than that of ninety-nine out of every hundred of his contemporaries, and that we shall sorely miss him from among our counsellors.

Following this introductory historical and critical chapter the author proceeds to the two main subjects of his work; not to the whole subject of Heredity, but to the special problem of Inheritance of Acquired Characters, and secondly to the Wallace-Weismann doctrine of Utility, leaving Isolation and Physiological Selection for a third Part. As regards inheritance, he nowhere defines his views more positively than in the following paragraph:

"For my own part, as stated in the *Examination*,¹ I have always been disposed "to accept Mr. Galton's theory of Stirp in preference to that of Germ-Plasm on "this very ground—i. e., that it does not dogmatically exclude the possibility of an "occasional inheritance of acquired characters in faint though cumulative degrees."

In other words, he accepts the "continuity" without the absolute "isolation" of the hereditary substance, and goes on to say that the only question in debate is whether, as Darwin believed, causes of the Lamarckian order modifying "continuity" are not absolutely necessary in order to explain some of the phenomena of evolution. The evidence available on either side is presumptive, not demonstrative. The logical position of one side is as strong as that of the opposite side and high authorities are very evenly divided. Among various kinds of evidence, Mr. Romanes thinks lightly of that advanced by the American palæontologists, classing it as indirect, and in the reviewer's opinion failing to recognise that palæontological evidence is entirely unique in that it gives the whole history of many adaptive characters. On the other hand he holds that in the neuro-muscular machinery, in the domain of reflex actions and instinctive actions, we may expect to find our best indirect evidence of use-inheritance as an evolution factor, for here the principles of co-ordination and co-adaptation reach their highest point. It is satisfactory to learn definitely that Mr. Romanes took his final stand with Darwin and Spencer in regarding instinct as inherited habit, but we are disappointed to find that his opinions rest wholly upon logical considerations.

After thus far committing himself to the Lamarckian theory, he immediately proceeds to take the inconsistent position that the whole line of evidence for the inherited effects of use and disuse in anatomical characters is practically worthless. The apparent influences of disuse may, he thinks, be wholly explained by his principles of "Cessation" and "Reversal of Selection" (Weismann's Panmixia), and we cannot help feeling here that he shows some favoritism for his own mental offspring. In criticism of this theory of degeneration, we cannot direct attention too

¹*Examination of Weismannism*, The Open Court Publishing Company, Chicago.

strongly to the one illogical vein which runs through the book, namely, the assumption that certain body-cell activities are inherited while others are not, for of one fact we may feel absolutely confident, either that the Lamarckian principle is operative alike through all the live tissues containing chromatin or it is not operative at all. We cannot agree with the author that the effects of habit in the cells of the nervous system are transmitted while those in bone and muscle cells are not.

Strong as is the argument from nascent and full-fledged reflexes, we are now satiated with logic and crave experiments of the kind Lloyd Morgan is now making. It is unfair, however, to leave the impression that Mr. Romanes was of the pure logic school. He here informs us of several very ingenious lines of experimental work which he carried on for years uniformly without success (*vide* pp. 143-149), and the most original section of the present work is the full account of his repetition of the celebrated experiments of Brown-Séquard. His object was to verify these experiments and especially to meet the well-known criticism of Weismann, that the alleged transmission of induced epilepsy is due to germinal infection. His most successful operation was in the production of haematoma and dry gangrene of the ears by an injury to the restiform bodies of the brain. As regards the parents operated upon, the ear degeneration is very complete and supervenes after several weeks or months. In the progeny the morbid state occasionally reappears. It always affects members of the *same litter* at the same time and extends as a rule only to the middle third of the ear. Weismann's infection hypothesis is disproved by the failure of inoculation to produce similar results. Altogether, Mr. Romanes's experiments fully corroborate those of Brown-Séquard in principle, if not in all details, and together with those of Westphal and Obersteiner seem to establish conclusively that a profound localised injury to the nervous system is occasionally followed by the transmission of similar localised results.

It does not appear that either of these investigators undertook a microscopic examination of the restiform bodies in the progeny in order to ascertain whether the effects of mutilation were transmitted.

The author then cites the striking modifications of higher plants by change of environment under the experiments of Hoffmann, Carrière, Lesage, Bailey, Henslow, and others. It is to these modifications that the term "self-adaptation" has been applied. They undoubtedly furnish the most complete disproof of the adequacy of the "selection" theory, but Mr. Romanes certainly errs in placing them in the column of evidence of transmission of acquired characters, for the very suddenness of these environmental changes proves that we are witnessing an individual *saltation*, rather than a slowly inherited modification. A seashore plant transported to dry soil jumps into a new type as a matter of purely *individual growth*. The new type is accumulative in successive generations, and thus undoubtedly in nature, as Buffon observed a century ago, "many species are no longer what they formerly were." But just when we are forming the apparently safe induction that these somatogenic characters have become blastogenic we transport the highly modified

descendant to its old seashore home, and, *presto*, the original type reappears. The causes and extent of these remarkable "adjustments of internal relations to external relations," to use Spencer's phrase, remain to be more thoroughly investigated. They furnish the main motive of the anti-selectionists as well as the basis of the new teleology of such writers as Driesch, who believes that the purposive direction of the activities of protoplasm constitutes a problem as insoluble as the nature of life itself. Driesch does not find in these phenomena a proof of the specific Lamarckian problem, nor can we. In fact, it is essentially a distinct problem, which has arisen since Lamarck's and even since Darwin's time, although suggested by some of Darwin's critics, such as Asa Gray.

The latter half of the work, devoted to the utility problem, opens with the demonstration that Darwinism is primarily a theory of the origin of adaptations; secondarily, of the origin of species and of all natural divisions of animals and plants. This is followed by a detailed review of the whole subject of the usefulness or neutrality of characters of different kinds in the struggle for existence. As in the earlier sections, Mr. Romanes shows conclusively that he has Darwin upon his side and that the Wallace-Weismann position is ultra-Darwinian.

Like the original volume, this is an excellent work to place in the hands of students, from its singularly fair and accurate treatment of Post-Darwinian questions. We close it with renewed regret that the conclusion must come from another hand.

HENRY F. OSBORN.

MIND AND MOTION AND MONISM. By the late *George John Romanes, M. A., LL.D., F. R. S.* New York and London: Longmans, Green, & Co. 1895. Pages, 170.

This posthumous edition of the late Prof. George John Romanes's articles *Mind and Motion and Monism* outlines the philosophical basis of his religious position as set forth in his *Thoughts on Religion*. Professor Romanes advocates the theory of parallelism between mind and motion as now accepted by all scientific psychologists, according to which a thought or sensation is regarded as the psychical aspect of a brain-motion, and a brain-motion as the physiological aspect of a psychical event of some kind. We observe the motions of our fellow beings and conclude that their actions are accompanied with feeling the same as are our own actions of like kind. We observe objects only and objective motion, but we suppose them to be animated according to their organisation. This theory is called Monism, combining the two one-sided positions of spiritualism and materialism. Clifford calls the soul with which we endow the motions of our fellow creatures, an eject (in contradistinction to "object"), and concluding that even physical events possess an aspect that is analogous to the psychical aspect of brain-motion, speaks of the world as an eject. Romanes endorses Clifford's theory but makes his own application. Considering the fact that all motions have their psychical aspects, he concludes that we cannot know what psychical value the cosmic motions of planets

and stars may have, and drawing the adjoined diagram he establishes upon the basis of this "monistic agnosticism" his belief in the existence of God, not indeed as a verifiable theory but as an hypothesis for which there is a great probability, and which may at least provisionally be used until we find ourselves obliged to replace it by more exact knowledge. In the adjoined diagram, *Z* the dark centre of our experience represents the brain-motions of man, darkly shaded in order to indicate their deep psychic significance. *Y* represents the sphere of the lower animals whose psychic life is dimmer and less concentrated. In *X* we reach the inorganic domain, which, according to Clifford, remains unshaded on account of the absence of organisation, while to theologians and theists generally it ought to be shaded more deeply than *Y* and *Z*.



The existence of the God of Professor Romanes is, as conceded by himself, quite provisional and hypothetical, and is therefore unavailable as a religious idea. But granting that Professor Romanes's God existed and was endowed with a personal consciousness, what would God be? He would be a huge, world-large ego, a gigantic personality, an individual creature of an enormous size; but he would be a concrete and particular being of a definite organisation like ourselves. He would be the spirit of the universe, and would, like all souls, be thinking, willing, and plodding. This is Brahma, the world-soul, but not God, for such a world-ego lacks all the attributes of divinity and possesses all the qualities of individual creatures. What Buddha says of Ishvara, the personal God, applies in every respect with equal force to Professor Romanes's God; granting that he exists, we can recog-

nise in him only our eldest brother, not the ultimate authority of moral conduct. For he is not identical with the eternal Divinity which appears in the enlightenment of all the Buddhas, and Buddha's claim of being superior to Ishvara and Brahma is justified. Compare this world-soul-God to the Nomotheism, as we may call the God-conception of the Religion of Science, and you will at once understand that the true God cannot be an individual, not a particular being, not a concrete personality, but must be the eternal and omnipresent, supernatural¹ and superpersonal,² the immutable and irrefragable order of existence, the Logos that was in the beginning and whose divinity appears in the cosmic order which naturalists reveal to us in their various aspects called laws of nature.

Professor Romanes's God, in order to create and govern the world correctly, must first make himself acquainted with the eternal laws of being, he must make his calculations and consider his plans with reference to the laws of mechanics; he must work out designs which are liable to miscarry unless they agree with the immutable norms of eternal necessity. But Professor Romanes might say with others who share his belief in a personal world-ego-God, that God created the eternal laws of the universe; to which I reply that the formal laws (such as $2 \times 2 = 4$, the conservation of matter and energy, causality, etc.) are intrinsically necessary, and God could not have created them differently from what they are. If they are not parts and parcels of God, they are certainly more eternal, more divine, more immutable than God. They would be, and they are, the God of any world-soul-God; and if they are the god of all gods, why should not we recognise in them the sole God, the source of wisdom and righteousness. Taking this view, we understand that every rational being that is in possession of universal concepts, bears God's image, and the morally perfect man is "God become flesh."

This is in brief our view of God as contrasted with Professor Romanes's God.

P. C.

SYSTEMATISCHE PHYLOGENIE DER WIRBELTHIERE. (Vertebrata.) By *Ernst Haeckel*.

Berlin: Georg Reimer. 1895. Pages, 680.

The first part of Professor Haeckel's "Systematic Phylogeny" appeared in 1894, and we may expect the second, which treats of the Invertebrates, in 1896. The present, or third part, gives in outline a hypothetical ancestral history of the Vertebrates. The original sketch and idea of this life-history of terrestrial organisms was propounded in 1866, and put in a popular form in 1868. The enormous

¹ The term "supernatural" must be taken in the literal sense of the word. The intrinsic necessity and universality which Kant discovered in transcendental cognition, implies that the most universal laws (such as $1 + 1 = 2$) hold good not only for this actual world in which we live but for any possible world; they are applicable to nature and to anything whether existent or non-existent. The Logos is not limited to our world-system; it is universally supreme; in a word, the Logos is supernatural.

² It would be misleading to conceive of God, the irrefragable law of existence, as simply bare of personality. God is the prototype of all personality, and possessing the conditions of personality, we propose to call him "superpersonal."

advances made in all the departments underlying our phylogenetic insight into life have now, after thirty years, rendered it possible for the author to fill out the gaps and supply many of the details of the original system. None but a specialist could judge or appreciate the absolute scientific legitimacy of such a tremendous plan. But be that what it may, nothing but unqualified admiration is due to the indefatigable efforts and comprehensive erudition of the great naturalist, its author, who has done more perhaps than any scientist living towards stimulating, organising, and interpreting biological inquiry, and who, with a modest confession of the faults of his proposed system, merely hopes that his new sketch will contribute, in some degree, to the promotion and extension of that genuine natural history, which, in his opinion, is destined to solve the highest problems of science. We find in the last remark, indeed, the keynote of the work. It is not a text-book, but merely a hypothetical structure, designed to show the lines along which further work in the construction of the hypothetical genealogy of life is to be conducted. The value of a plausible but intricate hypothesis can be determined only after its main conclusions have been elaborated; but the discipline of such a plan and its execution, in a heuristic regard, is invaluable.

T. J. McC.

ALGEBRA UND LOGIK DER RELATIVE. Der Vorlesungen über die Algebra der Logik dritter Band. By *Ernst Schröder*. Leipzig: B. G. Teubner. 1895. Pages, 649.

The materials of Prof. Ernst Schröder's great work on the *Algebra and Logic of the Relatives* appear to grow under his hands. The third volume was intended as the last part, and here we have the first stately instalment only of the third volume, but this is exactly what we must expect, considering the fact that we have here the foundation of a new science, the algebra of thought, that is to say, language expressed in the abstractest possible symbols, which, it is hoped, will enhance man's power of thought as much as algebra made the solution of our various arithmetical problems easier. As to the plan of the whole work, we refer the reader to our review of the first volume of the book. The present volume treats mainly on the operation of binary and unary relatives. Professor Schröder draws largely upon Charles Peirce's methods, as set forth in scattered articles, and on Dedekind's theory of concatenations.

We must here be satisfied with the mere announcement of the book, as we intend to give it a more careful review on its completion.

P. C.

ANARCHY OR GOVERNMENT? An Inquiry in Fundamental Politics. By *William Mackintire Salter*. New York and Boston: Thomas Y. Crowell & Co. 1895. Pages, 176. Price, 75 cents.

"In a time of social unrest and uncertainty like the present," says Mr. Salter, "it may not be amiss to go back to first principles." It is the author's object to get at the norms which underlie the action of government, so that we can readily judge

of the rightness or unrightness of particular acts of the State. The book is a summary of lectures which he gave in 1894 at the School of Applied Ethics in Plymouth and afterwards in Philadelphia. His central conviction is, "that political advances "are frequently opposed on grounds which, if acted on and carried to their appropriate conclusion, would result in undoing government altogether—save for purposes of defence in time of war." He says further:

"The justification of government is always not its abstract desirability, but its "practical necessity. I think that the events in Pullman and in Chicago, indeed the "trend of affairs in the modern industrial world generally, go to show that our old "system of liberty or anarchy [by anarchy Mr. Salter understands a state of things "without government] is breaking down, just as feudal anarchy broke down at the "beginning of the modern epoch in Europe in the fifteenth and sixteenth centuries." We see the author is in favor of a species of qualified nationalism.

Mr. Salter writes a pleasant, earnest, and simple style, and has the merit, nowadays rare among authors, of never inflicting large books upon the public. He develops his conclusions in connexion with practical examples, and we may recommend his book to the general reader as helpful and stimulating. μκρκ.

THE RELIGIONS OF INDIA. By *Edward Washburn Hopkins, Ph. D.* (Leipsic), Professor of Sanskrit and Comparative Philology in Byrn Mawr College. Boston, U. S. A., and London: Ginn & Company. 1895. Pages, 612. Price, \$1.85.

Dr. Morris Jastrow, Professor of Semitic Languages in the University of Pennsylvania, has projected the publication of a series of handbooks on the history of religions, of which he is to be the editor. It is his object to produce a series of manuals for the historical study of religions in our universities and seminaries, while at the same time to meet the requirements of reliable reference books, summing up the present status of our knowledge of the religions of antiquity, and giving all in the popular manner of presentation which is demanded by the growing interest taken by people of all classes in the historical and practical study of this subject, which was notably promoted by the recent World's Parliament at Chicago. The series will contain a treatise on "The Religion of Babylonia and Assyria" by the editor himself, and this will be followed by other manuals by equally eminent authorities on "The Religion of the Ancient Teutons," "The Religion of Persia," "The Religion of Israel," and by a general "Introduction to the History of Religions" by Prof. C. H. Toy of Harvard.

The present volume is the first number of the series. Its selection as a leading volume, the position of the author, and his evident full acquaintance with the best literature on the subject and with the original sources, are a sufficient guarantee of the trustworthiness and merits of the book. The author's idea has been to conduct the reader to a knowledge of the religions of India by actual illustrations and facts as distinguished from abstract comment upon, and exegesis of, the subject-matter

of those religions. His method is thus the opposite of that of Barth in his admirable and unapproached handbook on this subject. He says: "Whereas Barth . . . aimed at making his reader know all about the religions of India, we have sought to make our reader know those religions. We have tried to show the lines on which developed the various theological and moral conceptions of the Hindus, not only by furnishing, from the point of view of a foreign critic, an annotated narrative of the growth of these conceptions, but also and chiefly by taking the reader step by step through the literature that contains the records of India's dogmas." He has sought to cause the religions of India "to reveal themselves." He has not, he says, much to offer to the professional Indologist, as his work is intended only for students, but he thinks that his review of the relation of Vedic belief to that of the primitive Aryans is one that might be substituted with advantage for many current theories. This view would seem to be that *deva* worship is the immediate predecessor of the Hindu religion—a belief which is substantiated by Zarathustra's rejection of the *daevas*, which must be the same as *devas*.

But the author's special field of investigation has lain along the lines of Hinduism, and in his chapters on this subject he expects that Sanskrit scholars of the Hindu epoch will find something worthy of their attention. The subjects treated are, the character of the people and country, the Rig Veda in all its aspects, the early Hindu divinities and those of other Aryans, Brahmanism, Jainism, Buddhism, Hinduism, the Purāṇas, modern Hindu sects, religious traits of the wild tribes, and the relations of India and the West. The book contains a passable map of India, which is probably sufficient for its purposes, a tolerable index, but by no means exhaustive for a text-book or reference-book, and lastly, the matter is very well suited as regards sub-titles and general typography for the ends of instruction. The author has wisely rejected the cumbrous mode of transcription of the *Sacred Books of the East*, and employed a simpler yet certainly sufficient method. μκρκ.

THE SAMKHYA-PRAVACANA-BHASYA, OR COMMENTARY ON THE EXPOSITION OF THE SAMKHYA PHILOSOPHY. By *Vijñanabhikṣu*. Edited by *Richard Garbe*. Boston: Ginn & Co. 1895. Pages, 195.

Prof. Richard Garbe, who is well known to the readers of *The Monist* by his contributions on Indian and Greek philosophy, has recently been the recipient of a high honor, being made the successor of Roth, the famous Professor of Sanskrit in Tübingen. His co-operation in the Harvard Oriental Series, of which Prof. C. R. Lanman is editor, is one of the gratifying and unmistakable evidences of the international character which research is now assuming and especially of the high and important place which American scholarship and enterprise is taking in the world of inquiry. Professor Garbe says: "I hope and trust that the present edition will "prove to be one of the nearest approaches to absolute correctness to be found "among Sanskrit texts. If this turns out to be the case, the result is to be ascribed "chiefly to the unselfish assistance which Professor Lanman has rendered me in

" the proof-reading, and for which my most hearty thanks are due to him." The present book is the text of a commentary on the sūtras or aphorisms of the Sāṅkhya philosophy, for a knowledge of which we may refer non-Sanskrit students to Professor Garbe's article in *The Monist* for January, 1894, to his article "Sāṅkhya" in *Johnson's Universal Cyclopædia*, or to his exhaustive exposition of the subject in his recent work, *Die Samkhya-Philosophie*, Leipsic, 1894. μ.

DIE WEISSAGUNGEN JESU CHRISTI VON SEINEM TODE, SEINER AUFERSTEHUNG UND WIEDERKUNFT UND IHRE ERFÜLLUNG. By *Prof. Paul Schwartzkopff*, Ph.D. Göttingen : Vandenhoeck und Ruprecht. 1895. Pages, 205.

The present booklet is about one-fourth of a larger work, the subject of which is "God's revelation in Jesus Christ according to its content, extent, and limits." The author has published this, his inquiry into "the prophecies of Jesus Christ, concerning his death, resurrection, and his second coming, and their fulfilment," in advance of his larger book, on account of their paramount importance. His endeavor has been critically to discern, and psychologically to understand, the full moral and religious import of the highest revelation, by discriminating between the divine substance and the human form, which latter is historically conditioned. His aim is to prove the centrality of Jesus in the Christian revelation, which he does by showing that whatever can be found to be incidental or transient belongs to that which is historically conditioned, must be referred to the form, not the substance, of the mission of Jesus.

The main crux of our New Testament exegesis is the problem of the bodily resurrection of Christ, and we possess in this book a review of its main difficulties. Professor Schwartzkopff has, after long hesitation, come to the conclusion that the bodily resurrection of Jesus has to be discarded in order to be replaced by the belief in a spiritual personality of Jesus. He says (page 78): "Undoubtedly the belief of the first Christians in the resurrection of Jesus from the grave is the foundation of the Church. But it is true, too, that the victorious power of their belief did not consist in the form of their revelation, but in its substance. The appearances of Christ were evidences of the external form of the certainty of their belief in the Messianity of the victorious Jesus. From these appearances, which were conceived to be bodily, the early Christians drew the conclusion of a resurrection from the grave. The empty grave was a corroboration. This conception had no value in itself as regards the essence of their faith, but is merely of historical interest. It was of importance only that the early Christians should gain faith in the eternal mediatorship of the Son of God. This was the import of the Messianity of Jesus, and this was regarded by Paul also as the kernel of Christianity."

Professor Schwartzkopff passes in review the various interpretations given by the various theological schools of the resurrection. He states the fact of the prophecy of Jesus, and explains the origin of the belief of his resurrection on the

third day, and devotes to the belief in the corporeality of the Christ-appearances not less than forty-three pages.

Another problem of great importance which is discussed in the latter part of the book, is the belief of Jesus in the establishment of a Kingdom of God upon earth. The fact that Jesus believed in his second coming, which was to take place so soon that some persons of his own generation would still witness it, cannot be doubted, for the very non-fulfilment of these prophecies is the best proof that they are genuine. Later Christian writers would not have ventured to state them in the form in which they stand in the Gospels. Here the historian must psychologically analyse and comprehend the nature, the growth, and the importance of Christ's ideal, and Professor Schwartzkopff has done the last well. But he is confronted with the difficult problem that Jesus, who to him is the Son of God and the medium of God's revelation to mankind, is subject to an erroneous conception, so far as the mode of his future life and mission are concerned. And he says that Jesus appears indifferent toward all those common beliefs of his time which do not touch the very essence of his mission. His attitude is purely receptive, so as to be a mere echo of the views of his contemporaries. And certainly Christians will naturally have to accept this interpretation, because otherwise Jesus would have to be held responsible for all the superstitions and errors of his time, such as the belief in possession and the demoniacal character of diseases, etc.

As to the main conclusion of the author, which consists in his belief in the spiritual personality of Jesus, we have to say that in the form in which he holds it, he makes it a matter of personal conviction. He does not enter into the problem of what the nature of a spiritual personality may be, but we feel confident that as soon as that is investigated we shall not only be able to explain the significance of the belief in Christ's resurrection, but also to prove that Christ always was, is still, and will ever remain a living presence in the Christian Church; and that his aspirations and his religious ideal, which *de facto* constitute Christ's spiritual personality, have reacted, as a leaven in the dough, so powerfully upon mankind, that its evolution has been conducted into new channels and that historians are justly entitled to date a new era from the birth of Christ.

Though Professor Schwartzkopff's conception of Christ's spiritual personality may be different from ours, we must confess that his book is very sympathetic, for it proves that his religious faith is both honest and strong—honest to investigate the problem and face its difficulties; strong to hold fast that which after a careful scrutiny and purification appears to him to be the substance of the Christian message of salvation.

P. C.

ESSAYS AND NOTICES, PHILOSOPHICAL AND PSYCHOLOGICAL. By *Thomas Whittaker, B. A.* London: T. Fisher Unwin. 1895. Pages, 370. Price, 16s.

Mr. Whittaker is well known to the readers of philosophical magazines as the writer of competent and accurate analyses of philosophical works, in which he has not

omitted to weave suggestive speculations. He has collected in the present volume nearly all the essays of this character which he has written for the magazines since 1881. They cover a wide field of philosophical and psychological thought, as will be apparent from their titles which we here subjoin: "A Critical Essay in the Philosophy of History"; "'Mind-Stuff' from the Historical Point of View"; "Giordano Bruno"; "The Musical and the Picturesque Elements in Poetry"; "Individualism and State-Action"; "Volkmann's Psychology"; "Politics and Industry"; "On the Nature of Thought"; "The Theory of Justice"; "Animal Intelligence"; "Æsthetics"; "On the Ethics of Naturalism"; "The Philosophy of Redemption"; "Philosophical Antinomies"; "Giordano Bruno and his Time"; "Dead Matter and Living Matter"; "On Free-Will"; "Idealism in England in the Eighteenth Century"; "Physical Realism"; "Reality as Phenomenon"; "Thought and Life"; "The Laws of Imitation"; "The Problem of Causality"; "The Philosophical Basis of Evolution"; Appendix: "Correspondence with M. Renouvier"; "The Psychology of Stimulants." The common motive of all these essays and reviews has been "an effort to arrive at something positive through criticism," and thus is justified their appearance in a single volume. Mr. Whittaker does not assert that he has "attained any result capable of being summed up in a complete formula," but he believes, nevertheless, that in questions of metaphysics something can be said with certainty, and something with a high degree of intellectual assurance. And that is briefly as follows: he finds that absolute certainty is not to be sought in ontology but only in the theory of knowledge. "All that is demonstrable in metaphysics is idealism in the strict philosophical sense." He takes the upshot of science to be merely nominalistic, and asserts that it requires as its complement a theory of reality, that is a metaphysic, on behalf of which he puts in a plea against agnosticism as fettering the rightful impulse of mankind to speculate. But as to what this certainty is, Mr. Whittaker only arrives at extremely abstract and formal propositions, although he admits as theoretically consistent either a doctrine of monads or a doctrine of a permanent universal being, *intellectus infinitus*, for the further development of reality. The style of these essays is agreeable and they show much erudition. In the way of comments upon the history of philosophy and current problems they will be valuable.

μκρκ.

THE INDIVIDUAL AND THE STATE. An Essay on Justice. A Thesis Accepted by the Faculty of Cornell University for the Degree of Doctor of Philosophy. By *Thomas Wardlaw Taylor, Jr., M. A.* Boston: Ginn & Co. 1895. Pages, 90.

It is fast becoming the custom in our universities, it would seem, to *print* theses accepted for the doctorate, and when presented by mature students and of intrinsic value, the custom is certainly a good one. The latest document of this character which has come into our hands, is the present one by Mr. Taylor. It seems to fulfil the above criteria and is written in an earnest philosophical spirit, not too heavy,

and showing withal familiarity with the best literature and sources of the subject. We may give an idea of his views by the following quotation, where he is speaking of individualism and socialism: "The individual serves the social organism of which he is a member, but at the same time he is more than a member of that organism, and the organism serves him, and it is impossible to say that the individual is above society, or that society is above the individual, for in certain aspects each proposition is true."

μ.

DIE MODERNE PHYSIOLOGISCHE PSYCHOLOGIE IN DEUTSCHLAND. Eine historisch-kritische Untersuchung mit besonderer Berücksichtigung des Problems der Aufmerksamkeit. By *Dr. W. Heinrich*. Zürich: E. Speidel. 1895. Pages, 235. Price, M. 4.

After an historical introduction, treating of the influence of Christianity on science, and leading up to the beginning of Herbart's "psychology without a soul," Dr. Heinrich discusses the theories of Fechner, the father of experimental investigation, and Helmholtz, G. E. Müller and Pilzecker, Wundt, N. Lange, Külpe, Münsterberg, Ziehen, and Avenarius. The standard by which our author proposes to measure the theories of these men is "the law of psychical parallelism"; but in doing so he misrepresents Wundt's position, and condemns it as metaphysical. It is true enough that many disciples of Wundt have gone to the extreme of changing psychology to a mere measurement of reaction-times and other trivialities, but Wundt himself represents more than that. The reviewer is not an adherent of Wundt's, he does not even accept several of his basic propositions, but he believes that some of Wundt's disciples show little gratitude toward their master when forgetful of what they learned from him and what modern psychology owes him, they attack him on small issues, which, closely considered, are mere misconceptions of Wundt's real position. Whatever Wundt's shortcomings may be, his influence upon the evolution of psychology should not be underrated. If the author did not learn more from Wundt than the digest on pp. 80-126, with the overcritical summary on page 116, it is certainly not Wundt's fault. The appreciation which our author grudges to Wundt, is given in large measure to Münsterberg, whose merits are strangely exaggerated. In fact, the latter and Richard Avenarius are apparently, in the whole history of German psychology, the only ones with whom Dr. Heinrich finds no fault.

The problem of attention, the treatment of which is promised in the title of the book, is only incidentally touched upon, as, for instance, when the author presents us with a brief extract from Ribot's *Psychology of Attention* (on pp. 168-170).

†. Br2v.

PERIODICALS.

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SELF-CONSCIOUSNESS, SOCIAL CONSCIOUSNESS, AND NATURE. II. By *Prof. J. Royce*.—THE QUESTION OF AUTHORITY IN EARLY ENGLISH ETHICS. By *Dr. Norman Wilde*.—ETHICS, THEORETICAL AND APPLIED. By *Ernest M. Bowden*.—NATURA NATURANS. By *William W. Carlile*.—DISCUSSIONS : Professor Watson on Fullerton's Translation of Spinoza. By *Prof. D. S. Miller* ; An Explanation. By *Prof. J. H. Hyslop*.—BOOK REVIEWS, ETC.—(Boston, New York, Chicago : Ginn & Co.)

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THE MONIST.

ON THE STEREOSCOPIC APPLICATION OF ROENTGEN'S RAYS.¹

THIRTY years ago I described in the *Proceedings of the Vienna Academy of Sciences*² a procedure for obtaining transparent stereoscopic pictures of invisible bodies, machines, anatomical objects, and so forth. The stereoscopic impression is interrupted, a part of the object is withdrawn, the exposure is repeated, and so on, as often as is necessary. In this manner parts normally concealed or enclosed are made to appear on the picture with perfect distinctness.³

¹ Communicated as a comment on the article in No. 441 of *The Open Court*, "The New X-Rays."

² "Ueber wissenschaftliche Anwendungen der Photographie und Stereoscopie." Sitzung vom 11ten Mai, 1866.

³ See my *Popular Scientific Lectures*, Chicago, Open Court Publishing Company, 1895, page 73. The passage runs substantially as follows:

"The stereoscope can visualise for us things which we never see with equal clearness in real objects. You know that if you move around much while your photograph is being taken, your picture will come out like that of a Hindu deity, with several heads or several arms, which, at the spaces where they overlap, show forth with equal distinctness, so that we seem to see the one picture *through* the other. If a person moves quickly away from the camera before the impression is completed, the objects behind him will also be imprinted upon the photograph; the person will look transparent. Photographic ghosts are made in this way.

"Some very useful applications may be made of this discovery. For example, if we photograph a machine stereoscopically, successively removing during the operation the single parts (where of course the impression suffers interruptions), we obtain a transparent view, endowed with all the marks of spatial solidity, in which is distinctly visualised the interaction of parts normally concealed. I have employed this method for obtaining transparent stereoscopic views of anatomical structures."

At the time, I could not have foreseen that this procedure, which furnishes wonderful results, but frequently entails great labor, should be destined to undergo so striking a simplification.

When Röntgen's discovery was made known, I requested Dr. I. M. Eder, of Vienna,—for I am not now in a position myself to undertake experiments in photography,—to attempt a stereoscopic photograph with the x rays, which he performed with beautiful and successful results (February 13, 1896). Since lenses cannot be employed in this process, resource was had to the following procedure.

A mouse was placed on a piece of black cardboard, beneath which lay a photographic plate, and the whole was irradiated by a Crookes's tube. Then, without disturbing the mouse, the plate was changed and the position of the Crookes's tube shifted. The two photographic shadow-pictures, thus obtained from two different points, could now be combined into a phantom-picture of the mouse, in which the whole skeleton appears in marvellously distinct and solid outlines. By the injection of substances into the blood-vessels, these also could be obtained.

The pictures obtained in this manner would never, of course, rival the perfection of the photographs taken by my old method, but on the other hand, the process is incomparably simpler, it necessitates no detailed preparations, and, most important of all, in many cases, photographs by it may be obtained of a living, undissected man.

Naturally I have also attempted to obtain two Röntgen shadow-pictures of the same anatomical object on a fluorescent screen, and by the intermediation of photography to combine the two directly into a stereoscopic result. But the attempt failed, owing to the weakness of the fluorescence even at short distances from the source of radiation. Beyond doubt, however, means will be devised for augmenting the fluorescent effect, probably by the construction of windows of different material from glass, which greatly obstructs the passage of the x -rays and permits only a small fraction of their effect to issue from the Crookes's tube. Then a surgeon may obtain a direct stereoscopic view, say, of a stone in the bladder and of the position of his operating instrument.

It is difficult to determine whether the x -rays are longitudinal. Since they can neither be refracted nor reflected, there is little hope of their being polarised. But so long as the *absence* of polarisation is not demonstrated, it cannot be asserted that the x -rays are longitudinal.

The x -rays cannot consist of isolated impacts, as Huygens conceived light; but they must be *periodic* and *short-waved*, for otherwise such sharp shadows could not be produced. As yet, no diffraction has been shown.

The non-appearance of diffraction-*bands* might be explained by composition from widely-varying wave-lengths. But the separation of the wave-lengths by absorption also appears to present formidable difficulties. There can scarce be a thought of short-waved ultra-violet light, for ultra-violet light can be refracted, and just the shortest waves are absorbed by thin laminæ of air. In fact, the question grows constantly more difficult and more interesting. Rarely has a discovery so fascinated me, and I should take great pleasure in experimenting on these questions, were that not primarily Röntgen's own privilege.

E. MACH.

VIENNA.

ON THE NATURE OF ROENTGEN'S RAYS.

RARELY has a scientific discovery provoked such a stir in the world as that made in Würzburg in December last by Professor Röntgen. Although Röntgen is a native Dutchman, he received his education and pursued his academic career entirely in German universities. A genuine German scholar, he was modest enough not to furnish the news of his surprising discovery immediately to the public at large, but contented himself with addressing his communication to the proper quarters—to his professional colleagues. It thus happened that scientists were the first to hear of the discovery, which was published in the Proceedings of the Würzburg Physical and Medical Society in December, 1895, under the title "A New Kind of Rays." Röntgen, however, had scarce communicated his discovery to his colleagues before the papers took up the interesting questions which it offered, and in a few weeks the entire civilised world was familiar with its character.

Doubtless many a newspaper reader shook his head dubiously on hearing of the discovery, and may have gone so far as to denounce it as an imposture. But when reproductions of pictures taken by Röntgen's rays appeared in the periodicals and in the show windows, and when the German Emperor invited Röntgen to Potsdam to deliver an experimental lecture on the new "energy," the final doubts in the public mind were removed ; there was no thought of imposture, and it was recognised that we were confronted in Röntgen's rays with a discovery of stupendous scope.

Every educated man in the world now knows that physicists are able to produce invisible rays which have the power of penetrating more or less readily all substances, whether opaque or not,

and, having passed through them, of indicating on sensitive photographic plates, by the lightness or darkness of their impressions, whether they have passed through a great deal or only a little of the intervening substance, just as in photography heavy-black or light-black impressions of the plate show whether the rays have emanated from bright or from dark spots on the object to be photographed. But though this fact is familiar to every one, the previous history of the new physical agent and our surmises as to its character are unknown to the great majority of unprofessional readers, and to clear up this matter will be the object of the following pages, wherein we shall have to leave unnoticed the possible applications of the new discovery to anatomy and surgery, as these have already been sufficiently exploited in the press.

In the year 1789 the electric current was discovered by Galvani, of Bologna; but it was not until several years later that its most important properties, at least as distinguished from frictional electricity, were disclosed by Volta. Although galvanic batteries as a means of producing electric currents were studied and perfected in the next few decades, three great discoveries had yet to be made in the province of electricity before the new agent could attain the importance in civilised life which it to-day occupies, and before theoretical physics could investigate more closely its nature and character. These three discoveries were as follows :

1. In 1820 Oerstedt, of Copenhagen, discovered that an electric current flowing round a magnetic needle deflects the same, and that a magnetic needle rendered insusceptible to the influences of terrestrial magnetism and free to rotate in any direction, will place itself at right angles to the plane of an electric current surrounding it.
2. In 1825 Arago, of Paris, discovered that a piece of soft iron, about which a wire connected with a battery has been wound in spirals, is transformed into a magnet and continues in the magnetic condition as long as the circuit remains closed, but is again unmagnetised when the circuit is broken.
3. In 1831 Faraday, of London, discovered the so-called *induced currents* of electricity. If, he reasoned, the current was a source of magnetising action, as Arago had discovered, it was pos-

sible conversely that a magnet should be the source of a current-producing action. But Faraday found no confirmation of his conjecture. Twenty years later it could have been decided *a priori*, without experiment, that a magnet *at rest* could not give rise to a current. For that would have violated the law of the conservation of energy, agreeably to which work can be done only provided a like quantity of work has been previously expended in some way. Yet Faraday discovered the law, harmonising perfectly with the principle of the conservation of energy, that if a magnet be *approached* to a closed spiral circuit it will evoke in the circuit a sudden current lasting only for the moment of approach, but that when the magnet is *drawn away* from the spiral, a current in the opposite direction to the first will be momentarily set up therein. Instead of a magnet, a closed circuit carrying a current may be approached and removed, or instead of the latter the current in the circuit may be made alternately to appear and disappear, or its strength may be alternately increased and diminished.

Currents thus produced are called *currents of induction*, and apparatus designed to generate induced currents, rapidly alternating in direction, by means of common currents, are called *induction-coils*. An induction-coil consists (1) of a soft iron core, (2) of a primary wire spiral or helix enveloping the same and receiving an ordinary electric current, and (3) of a secondary wire spiral of thin wire and many turns, enveloping the first. The current sent through the primary spiral magnetises the iron core (compare the first discovery). The magnetised core then attracts a little iron hammer which is placed before it and regulated by a spring. This movement of the hammer breaks the metallic connexion with the primary spiral so that the current is interrupted and the iron core again unmagnetised. The hammer immediately jumps back from the iron core, the current is again set going, and the action described is repeated anew. By this apparatus, thus, we are enabled to make the current in the primary spiral repeatedly and alternately appear and disappear. According to Faraday's laws, now, every appearance of the main current in the primary coil must produce in the secondary coil an induced or *closing current*, as it is called, flowing in the opposite

direction and lasting but for a moment; whilst conversely every disappearance of the current must evoke an induced current flowing in the same direction with the main current, and called the *opening current*. Thus are produced in the secondary spiral in quick succession currents which flow in alternately opposite directions. These induced currents are of brief duration, but of enormous tension. Their powerful physiological action on the human body is familiar to every reader.

It is to these induction currents, discovered by Faraday in 1831, that we owe all the recent magnificent development of electro-technics. For not only is the art of telephoning based upon induction effects, but the performances of large dynamos, or machines designed to produce by mechanical work electrical currents of great intensity and high tension, are primarily rendered possible by induction effects. Without the discovery of induction it would have been impossible to illuminate a large city by thousands of arc-lights and to have replaced horse-power by electricity in our street railways. And also the more theoretical branches of physics—the physics of the laboratory—was started on a laborious but fruitful path of inquiry by this discovery of Faraday, the last station attained on which is Röntgen's rays.

In the first place it was discovered that induced currents could bring to a state of incandescence rarefied gases enclosed in glass tubes. Along in the fifties, Geissler of Bonn succeeded with the help of a perfected mercury air-pump, in constructing tubes which exhibited this incandescence of enclosed gases in a marked and beautiful manner. Into the two ends of these tubes, which were named *Geissler's tubes* after their inventor, are soldered platinum wires, the terminals of which are called electrodes. If the tube be not too long and the induction current be powerful enough, the current will force a passage between the two electrodes and in so doing will set the enclosed gas through which it must pass, in a state of vivid incandescence. It is observed in the experiment that only the opening current and not the closing current has the power of producing this luminous effect. The closing current, in fact, is always considerably weaker than the opening current, for

the reason that it is set up in the direction opposite to that of the main current, whereby it detracts both from the strength of the latter and from itself. Consequently, inasmuch as the effect of the opening current is alone operative in Geissler's tubes, we can distinguish in this experiment between the two electrodes, seeing that one is the point of entrance and the other the point of exit of the positive current. The first is called the *anode* and the second the *cathode*. Now when induction-currents are passed through a Geissler's tube, a bright, narrow fringe is observed at the cathode and subsequently a relatively dark, bluish light, the *glow-light* or *cathode-light*, whilst at the anode as also in the largest part of the space intervening between the two electrodes striæ of bright and reddish-yellow light are distinctly visible.

In the year 1869, Hittorf, of Münster, dissatisfied with the degree of rarefaction attained by the Geissler tubes then in the market, arrived at new physical results by pushing the rarefactions of the tubes to a still minuter degree of density, amounting to more than the hundred-thousandth part of that of the ordinary atmosphere, and by substituting thin platinum plates for Geissler's platinum wire electrodes. It turned out that as the rarefaction increased, the bluish glow-light of the cathodes continued to spread, until it finally filled the whole interior of the tube. The phenomena which made their appearance on the passing of oscillatory induction-discharges through tubes containing such highly rarefied gases, were described by Hittorf in a paper which appeared in Poggendorf-Wiedemann's *Annalen* in 1869, and was entitled "On the Electric Conduction of Gases." Subsequently an English physicist, Crookes, made substantially the same observations, and founded upon them the hypothesis of the existence of a fourth aggregate state of matter. The bodies found in this state he called "radiant matter." This hypothesis was soon recognised to be untenable; but as Crookes knew better how to direct widespread attention to his work, the tubes exhibiting such phenomena have since been called Crookes's tubes, although it would have been more correct to have called them Hittorf's tubes. Latterly they have been called *vacuum-tubes*, as ex-



Actinogram of a lady's hand, showing the position of a needle broken off in the thumb and outwardly invisible. Taken by Roentgen's rays in the Physical State Laboratory at Hamburg, February 22, 1896.

(a) *Needle in the hand.* (b) *Common photograph of the needle after extraction.*



Actinogram of a young plaice (*Platessa*) with shells in its intestines. Taken by Roentgen's rays in the Physical State Laboratory at Hamburg, February 21, 1896.

pressing the enormous degree of gaseous rarefaction attained in them.

One of the most striking properties of the cathode-light in vacuum-tubes is that wherever it strikes the glass it produces a vivid glow, termed fluorescence. Particularly remarkable, also, is the phenomenon, likewise observed by Hittorf, that the cathode-light unlike the induction-spark does not follow the curvature of the tube but is always propagated straight ahead in a *rectilinear* path. In all these cases, the cathode-ray itself is invisible; its existence is made known only upon its striking some substance, on which it excites the fluorescent effect.

Of the remaining properties of the cathode-light the following are important. It can set in motion easily-rotating bodies on which it impinges. Heat is generated at spots where its rays strike, at times in sufficient quantities to set metals aglow. If the cathode be concave in shape the course of the light will be the same as that of the paths of common luminous rays emitted from a reflector. Lastly, we will mention the effect produced on the glow-light of the cathode by magnets, which was first carefully studied by Plücker, and subsequently by Hittorf and Crookes. Exposed to the action of a magnet this light behaves like a thin rectilinear conductor carrying a current and having one of its terminals attached to the cathode, but with its other, as also with its entire flexible length, following the magnet, in utter disregard of the position it assumes relatively to the anode or positive electrode.

Despite all this knowledge scientists as yet had reached no positive conclusion regarding the nature of the cathode rays, although Hertz had rendered it probable that we were dealing here, not with paths of electric currents, but with genuine rays of light.

Such was the state of our knowledge touching these cathode-rays when Hertz made his pioneer experiments proving the undulatory mode of propagation of electricity and showing that both light and electricity were based upon wave-motions of the ether and differed only in respect of the wave-lengths being short for the first and long for the last.

What is the relation, now, of the cathode-rays to the new view

of Hertz, that light and electricity both have their origin in undulatory motions of the ether? There are two kinds of wave-motion—transverse and longitudinal. We have an example of transverse undulatory motion in waves of water, where each water-particle ascends and descends vertically whilst the wave itself is propagated in a horizontal direction. We have an example of longitudinal undulatory motion in waves of sound, where every air-particle moves backwards and forwards in the same line in which the sound is propagated, and where at the same spot alternate rarefactions and condensations of the air are produced.

Now ordinary luminous and electrical phenomena can be satisfactorily explained by the assumption of transverse waves in the ether, which is not the case, however, with the cathode-rays. On this account, Hertz, as we now know, once incidentally expressed in a lecture the opinion that the cathode-rays owed their origin to longitudinal electric waves.

Filled with such thoughts, Röntgen was conducting his experiments with good vacuum-tubes, for the purpose of experimentally ascertaining the nature of the cathode-rays. In the course of his work he found that *the cathode-rays were the generators of a new kind of rays, which, since they differed from the cathode-rays, he called x-rays*. The chief characteristics which distinguish the *x*-rays from the cathode-rays are, first, that the cathode-rays, as explained above, can be deflected by a magnet, while the *x*-rays, when exposed to the influence of the same, continue their course in a *rectilinear* path without taking the least notice of the magnet; secondly, that the *x*-rays penetrate more or less readily *all substances*, whether visible or invisible, whilst the cathode-rays, as Lenard has shown, although capable of penetrating substances, yet have so little of that power that there can scarce be a thought of their practical application. Consequently, the *x*-rays cannot be simply continuations of the cathode-rays, but must be an entirely new kind of rays, which at present we can only produce by means of the cathode-rays, but which it is quite possible may at some time or other be evoked by other means.

Common attributes of the two rays are, first, that they can be

neither regularly reflected nor refracted; and secondly, that they give rise to fluorescence. The point whence the x -rays originate is the spot where the cathode-rays strike the glass wall of the tube. From this point they are propagated in right lines in all directions. It is impossible to concentrate them by means of glass lenses, as is done with common light in photography, because they cannot be refracted. Nor is it possible to deflect them by a mirror, because they cannot be reflected. Hence, in order to make use of them, it is necessary in all cases to obtain a straight line between their point of origin on the wall of the vacuum-tube, the object which they are to penetrate, and the plate on which the effect is to be recorded. Owing to the conditions imposed by this requirement of rectilinearity between tube, object, and field of action, *a limit is set to the application of the method which cannot be surmounted.* Suppose, for instance, that a pickpocket is desirous of knowing what money I have in my purse; my trousers' pocket and my purse will offer no obstacle to him, but he will be considerably hindered by the necessity of getting a straight line between the vacuum-tube, the money in my pocket, and his eye, or rather the photographic plate held before his eye.

But contrasted with their inability to be reflected and refracted, which forms a serious hindrance to the practical application of the x -rays, stands their other property, which renders possible their application in all provinces—we refer to the fact that *all substances are pervious to them in a greater or less degree.* It appears that substances of high specific gravity absorb more of the effects of the x -rays than substances of low specific gravity, that is, are less pervious to them than the latter. For example, an aluminium plate must be three and one-half millimetres thick in order to absorb as much of the x -rays as a zinc plate one-tenth of a millimetre thick. Yet it is not to be supposed that the absorption of x -rays is proportional to the product of the thickness of the plate and the specific gravity of the substance of which it consists. All that is certain is that given the same thickness heavier substances absorb more than lighter substances. The different degrees of permeability to the x -rays shown by different substances may be clearly seen from the

hand reproduced in *The Open Court* of February 6, where the soft parts, cartilage, bones, and the gold of the engagement-ring are distinctly recognisable by the varying darkness of the parts.

The most important of the known properties of the x -rays are, first, that they produce fluorescence, and, secondly, that they are capable of producing chemical effects, even after they have passed through opaque and dense solids on their way from the vacuum-tube. This fluorescence may be evoked in a large variety of substances, like glass, quartz, etc., but its effect is most marked and vivid in barium platinocyanide. Röntgen had wrapped black paper round his vacuum-tube, and made the room totally dark. A paper screen painted with barium platinocyanide then glowed brilliantly whenever a discharge was passed through the darkened vacuum-tube.

We have made use of this property here in the Hamburg State-Laboratory in order to ascertain quickly whether a tube was sufficiently exhausted to emit the x -rays. For this purpose a blackened cylinder was used, to the end of which a crystal of barium platinocyanide had been attached. This cylinder was held before the eye, and the vacuum-tube observed through the blackened cylinder. On the making of the discharge, every time the crystal glowed the x -rays could be successfully employed for photographic purposes, but whenever the glow was imperceptible, the vacuum-tube was unfit for this use.

" X -spectacles" is the name the author has given to a little apparatus made of two such tubes, furnished with suitable fastenings behind the ears, and designed for both eyes. Paper coated with barium platinocyanide may also be used in place of the crystal. Equipped with a pair of x -spectacles, a man can tell by the relative intensities of the fluorescent spots whether the x -rays impinging on these spots have passed through much or little substance, and, under favorable circumstances, by this means we may detect the shape of dense objects enclosed in small, light boxes. For example, if we hold a little paper box made to contain a ring between the vacuum-tube and the x -spectacles, we can tell whether the box is empty or whether the ring is in it. Important improvements will be made

in the x -spectacles when scientists shall succeed in constructing chemically prepared plates which are as perfect as those at present in use in photography, but which shall differ from them in being totally insensitive to common light, while at the same time capable of receiving the impressions of the x -rays. A plate of this kind will be better than paper coated with barium platinocyanide, for the reason that the chemical changes evoked on the plate by the varying intensities of the incident x -rays would cause the object to stand out in far sharper relief than would the transient action of fluorescence. But there would be this drawback attending the operations of a man whose eyes were equipped with such an improved pair of x -spectacles, that he would have to insert new spectacle-glasses for every new object seen.

In the possibility last set forth we have mentioned the second of the two properties which have drawn the attention of the civilised world to the x -rays. The first of these two properties was that the rays penetrated all substances, though in varying degrees. The second is their power of producing chemical effects on photographic plates. By the intensity of their chemical effects on such plates the x -rays indicate the relative amount of substance they have passed through, and for this reason the description "photography of the invisible" has been justly applied to the new discovery. Even though a body be totally opaque, yet the molecular composition of its interior can be disclosed by the chemical action of the x -rays, especially if the vacuum-tube be brought to bear upon it from all sides. So far, only the common photographic plates have been generally employed for receiving the impressions of the x -rays. But it is quite unlikely that these plates are the best fitted for this purpose. It is a duty devolving on chemists and photographers, therefore, to discover experimentally the substances which are most sensitive to the x -rays, so that plates can be constructed which are better adapted than the common photographic plates for revealing the interior solid constitutions of bodies.

As the x -rays differ from the common light-rays by being incapable of regular reflexion and refraction and by suffering greater or less relative absorption, their effects on chemically prepared

plates and the employment of these effects for the manufacture of pictures cannot be called photography, or *light-drawing*. We might, perhaps, since their discoverer Röntgen has preferred the expression *x-rays*, say *x-ography* instead of photography, and this word has been actually used. Other physicists have formed the words *actinography* and *actinogram* from *ἀκτίς* (gen. *ἀκτίδος*), the Greek word for ray,—compounds which are not objectionable and which we shall use in the following.

We have referred to the construction of plates highly sensitive to the impressions of the *x-rays* as a technical problem of supreme importance provided actinography is ever to realise the expectations which physicians are already cherishing with regard to it. But we have to look upon the construction of suitable vacuum-tubes as a task of no less practical importance. The majority of tubes, even when purchased for Crookes's tubes, turn out to be useless. The members of the Hamburg State-Laboratory originally had the glass of their tubes made to order but undertook themselves the rarefaction of the air, which latter they accomplished by means of good mercury air-pumps. In this way a rarefaction of approximately one-millionth of the density of our atmosphere has been obtained.

But even the tubes thus constructed were not always fit for use. A few weeks ago tubes were received from the present proprietors of the firm of Geissler in Bonn, which were guaranteed to be adequately exhausted. On their arrival they at first proved to be unfit for use, but after they had remained lying several weeks, strange to say, they were found serviceable. A large number of the actinograms made in the Hamburg State-Laboratory have been produced by a tube which was permanently connected with a mercury air-pump. Whenever the tube ceased to work,—a condition readily discovered by means of the *x-spectacles*,—the pumping was continued till it reacquired its original power, usually after the lapse of a brief space of time.

In the last few days (Feb. 25) another important advance in this direction has been made in the Hamburg State-Laboratory. By the use of a newly patented mercury air-pump just obtained from Berlin, and automatically working by the suction of water, and sec-

only by the application of a method for removing the particles of matter that adhere to the inner walls of the tube and which at low pressures are readily transformed into gas, tubes have been constructed and are there in use since Friday, the 21st of February, which yield actinographic results far superior to anything obtained by the old tubes. Also the last tubes which have just recently been received from the firm of Geissler in Bonn are incomparably better than their first ones.

Three actinograms taken by the new improved tubes are particularly worthy of notice: (1) the actinogram of a plaice which has swallowed shells (its reproduction will be found accompanying this article); (2) an actinogram of an aborted human fœtus twelve to thirteen weeks old (unpublished); (3) the actinogram of a lady's hand into which a needle had been run a short time previously, and of which there was no outward trace (also accompanying this article). In the last case the surgeon who had brought the lady to the Laboratory removed the needle after a mere glance at the negative. The photograph of the needle was then placed side by side with the actinogram.

Further, the actinograms taken by the new tubes differ from the old ones not only in distinctness but also in the time of exposure required. With the new tubes the interior of the hand was taken as distinctly in five minutes as it had been with the old tubes in twenty minutes. The attempt will be made in a few days to actinograph the whole human body. It is to be sincerely hoped that these experiments will be successful, although of course the time of exposure will be considerably longer.

The merit of having successfully repeated Röntgen's experiments as early as the middle of January, and of having obtained unusually good negative actinograms at about that time, belongs to Professor Voller, the Director of the Hamburg Physical Laboratory. Dr. Voller also drew attention to the fact that vacuum-tubes in which induction-discharges are taking place *grow hot when they emit no x-rays*, that is, are unfit for actinographic purposes, *but remain cold when they do emit x-rays*, that is, are fit for actinographic service. This fact is important as showing that the *x-rays* constitute a new

form of energy into which the electric energy appearing in the vacuum-tubes can be transformed. When this electric energy is transformed into heat, it can then not be re-transformed into the new *x*-energy, and *vice versa*.

It will be seen, thus, that the Röntgen rays fall within the scope of the law of the conservation of energy, agreeably to which work can never be produced unless an equivalent quantity of work, be it in another form or not, has been expended, and conversely, work can never disappear without an equivalent quantity of work appearing in some other form. This great law is the monistic principle which embraces all physical forces, and also the newly discovered force.

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THE PHILOSOPHY OF MONEY.

IT HAS been suggested to me to write an article upon the philosophy of money. I do not feel competent to do this work as it ought to be done, but it is possible that I may be able to deal with the subject so as to make the elements plainer than they now are to plain people, leaving to others who have more time for study and reflexion to review the subject from the standpoint of the scholar and the student. I can only deal with monetary science on the basis of experience derived from more than fifty years' practice in the active pursuits of business life. I shall try to illustrate my thesis by such illustrations as I have been able to derive from somewhat desultory reading, undertaken from time to time with a view to testing a judgment already formed from experience, rather than with a view to forming a judgment on a historic basis.

It is very seldom that the faculty of observation and the opportunity for it are coupled with an academic mastery of the processes of thought, among those who deal with economic questions. The name of Adam Smith will occur to every student's mind as an exemplar of this combination. For that reason his work has justified what was said of it soon after its publication,—that “it would convince one generation and govern the next.” Had that book been published one generation earlier it is not probable that the economic blunders would have been made by which the English government forced the colonies of America into a war of separation.

The fault in a very great part of the present discussion of monetary science is due to the almost exclusively academic and *a priori* treatment of pending questions by many conspicuous writers who are without practical experience, on the one side,—and the dog-

matic persistence of many so-called practical men who are without the training of the university or the college, on the other. Hence it follows that the safest guides in directing legislation in recent years have been found among men who, without claiming to be either students or masters of monetary science, have had a sound legal training and have therefore become capable of weighing evidence, reviewing both sides of the case, sifting out fallacies, and reaching the true point of the whole discussion.

It is not without reason that the ablest men who have been charged with executive and administrative power in this country, and in almost all others, have been members of the legal profession. When preparation for the practice of law is accompanied by judicial qualities of mind, the true dignity of the science of law becomes manifest. We have lately owed the financial safety, the honor, and the credit of this nation to one of the most conspicuous exemplars of this rule.

I may be unable to cite all the authorities from whom I have derived most valuable information, fully sustaining, in my own belief, the conceptions or hypotheses which had been developed in my own business experience. One who reads without keeping any record of citations or authority from standard works is often unable to discriminate or to separate the conceptions which he has derived from his own experience from those which have been derived from books, or to measure the relative influence of either upon his own processes of reasoning.

In my effort to establish a true monetary theory from the conditions of the present by justifying it on the basis of the facts which have governed events in the far-distant past, I have been led to accept what may be called the theory of an empirical development of money, of weights, and of measures, as distinguished from the theory, especially of weights and measures, which is based on an assumed mastery by the ancients of the laws of astronomy and mathematics, thereby enabling those by whom weights and measures were first invented to give them a scientific basis. In order to justify this conclusion, regard may be given to certain present conditions connecting them with prehistoric periods. Weights, meas-

ures, and money are now in use among barbarous races who have no conception of science.

May it not be held that whatever form of society, method of distribution, monetary system, or process of what is called manufacturing, has ever existed upon the globe, corresponding conditions or similar practices now survive in some part of its area? Even the mythical conditions of the Garden of Eden, wherein people dwelt without need of working for their subsistence; where one needed not to take thought for the morrow, what he should eat, or what he should drink, or wherewithal should he be clothed, are still to be found on some of the islands of the south seas,—Adam and Eve, Cain and Abel, and the whole tribe or their types, are there, existing under conditions in which they have not been elevated to any conception of true manhood and womanhood by the necessity of labor.

Again, one may find the natural conditions and processes of the Stone Age in Patagonia, in Alaska, and in some other remote parts of the world, where men still manufacture and use flint implements and make their dug-out canoes with stone chisels.

Again, there are very many parts of the world where the inhabitants are clothed in fabrics, of which the thread is spun upon the prehistoric distaff, and the cloth is woven upon the hand-loom, corresponding identically with those of which we have the pictured record in Egypt, in Assyria, and elsewhere.

Lastly, there are said to be parts of Africa in which the prehistoric monetary unit, the cow, is still the measure of value and the store of wealth, under social and monetary conditions and methods of trade corresponding to the conditions of the ancient world of which we have knowledge: of Asia Minor, of Northern and Southern Europe, and even of the then remote Ireland, when in the early ages, at the dawn of history, domestic animals, including slaves, passed current in exchange, serving all the purposes of money. The cow was then the unit with which all other types constituting the "pecunia," or moneys, of the then known world were rated; that world being one of organised society, of art, of literature, and of an extensive commerce by land and sea.

May we not trace the development of our monetary systems from these conditions, of which we have faint and fainter records in the far distant past? Are we not even now almost under the necessity of correcting many popular conceptions of money and of monetary legislation by dealing with the conditions which first brought money into use? That is my idea of what a true philosophy of money should be. I can only regret my own inability to develop and state the terms of such a philosophy for lack of that thorough training which men who are forced to begin the work of getting a living very early in life are apt to miss.

* * *

So far as we can know anything of the condition of primitive man there may have been a period when not even barter existed, as there are now human beings of some of the lowest types who seem to have no conception of mutual service ; but even in the nomad or pastoral period an exchange of products or services was established and at that time domestic animals, notably the cow, had become the medium of exchange, serving the purpose of the instrument which we call money before the metals had come into monetary use and long before coinage had been invented. It is noticeable that art in its most refined sense had been developed before coinage existed, because the earliest examples of coins are examples of most artistic work. It is well proved that the earliest coins were made of gold and were equated with the cow and the ox, whose images they bear. Both gold and copper appear to have been precious or monetary metals before silver, because they were found in the condition of pure or native metal, while silver waited until the art of smelting had been learned.

Yet the monetary use of metal was not limited to these three. In many places iron became money and bronze or alloy was very widely used. In every instance and in each separate development of a monetary unit or medium of exchange, that substance—whether metal, shell, or some article of consumption—was adopted as money which was universally most valued or esteemed either for ornament or for use. In other words, without process of law, rule, or statute

in the modern sense, the people of every land have adopted some article of greatest valuation or esteem as their standard or unit of value, i. e., some article universally desired which could be passed from hand to hand in the conduct of trade ; after coinage was invented subsequently adding subsidiary coins for convenient use in lesser transactions, but never departing from the single standard or unit until the decrees of rulers or statute laws began to be applied in order to force a substance of lesser esteem or valuation into monetary use as a substitute for the unit of the highest valuation. Hence my reflexions led me to the hypothesis that the first conception of a decree or act of legal tender, enforcing the acceptance of one of two or more kinds of money at the choice of a debtor while depriving the creditor of any option, must have been born in fraud and nursed in corruption.

Good money—that is to say, coin which is worth as much after it is melted as it purports to be worth in the coin—requires no act of legal tender to enforce its use or acceptance. Bad money, which is not worth as much in bullion as it purports to be worth in coin, can only be passed by force. The very fact that a coin or its substitute promise of a coin can only be kept in circulation or in use as money by the force of an act of legal tender proves that the coin or its substitute promise is bad money.

As the subject is developed it will become apparent that money existed and was used as an instrument of exchange before coinage had been invented ; in the subsequent period coined money was used and did all the work of money before any act of legal tender or any legislative regulation regarding money had been conceived.

In order to comprehend the genesis of money one may deal with the various types and substances which have been adopted in various countries and among races which could have had no recourse to each other or to science in determining the choice of the material. Money has had its beginning in a common necessity coincident with the practice of commerce. So far as the facts can be traced, an exchange of products or services has been gradually evolved by almost every race of men, beginning with barter but soon developing the necessity for and the use of money. In each in-

stance the substance chosen has been the one most highly esteemed at that time and in that place, either for personal decoration or use. This will become manifest upon a recital of the different kinds of money of which the types are known. A most complete record may be found in *The Origin of Metallic Currency and Weight Standards*, W. A. Ridgeway, Cambridge, England, 1892, to which I have added a few examples from our own history. A summary of the different kinds of money, their past and present use, may illustrate the point which I have stated.

It is held that when man first learned to tame animals and changed from the nomadic to the pastoral stage, the cow or ox became the unit of value and the medium of exchange. In the Homeric record the cow and ox are constantly named as standards of valuation; they are equated with the talent, a measure of weight applied in Homer only to a given weight of gold. In the process of development the gold washed from the rivers of Asia and Europe was made into strings of small nuggets and the dust was enclosed in the quills of birds. Weighing by balance against seeds of barley or some other cereal was invented and applied to determining the quantity of gold then held to be equivalent to a cow or ox. Subsequently came new standards of coin estimated by weight,—the Stater, the Daric, the Shekel, the Bezant or Byzant. Lastly, about 700 B. C., came the invention of coinage, the coin of gold equivalent to one cow being stamped with the image of the cow or ox and containing one hundred and thirty to one hundred and thirty-five grains of gold. Other stamps were used, and there are traces of coinage of an earlier period bearing the stamp of the cow or ox. Whoever ventures into this field must be prepared for a contest with the numismatists. I can only say that in that contest, it seems to me, those who take the side of natural selection and of a derivation or rating of the coins to the previous standard have the best of the argument.

Herein we have the origin of historic money, but the necessity for a medium of exchange or unit of value was not limited to the historic world. The ancient money of China was a bronze or brass knife with a round flat handle with a square hole in the centre; the

copper cash of China of the present day, which is the only coin of China being a survival of the knife without the blade.

In many parts of the world—in Africa, East Indies, and North America—shells of various types were adopted.

Among the Samoyades of Northern Europe the reindeer is the unit of value.

In the earlier days of Virginia a given weight of tobacco was the standard.

In Iceland, stock-fish.

Among the Aztecs, gold and cacao seeds.

In some parts of Africa, iron hoes with socket for the handle, or round plates of iron made so as to be convertible into two hoes of a given size.

Among the Ostiaks of Asia, the skins of the Siberian squirrel.

Upon the Northwest coast of America, when trade was first opened, marten skins.

In Massachusetts Colony, in early times, bullets of lead served, which were of limited legal tender up to twelve.

In fact, whenever and wherever commerce has become established, the necessity for a common medium of exchange or unit of value has led to the selection of some available commodity of common desire either for ornament or for use, first passing by tale or count, later by weight.

With the successive steps in the progress and organisation of society the metals considered precious, first gold and copper of native purity, then silver and iron after the art of smelting had been discovered, displaced the more primitive forms of money—next iron was eliminated; copper was relegated to token or conventional money, and the two metals gold and silver held the sole title of precious. Silver still retains its place as the unit of value among the poorer nations, where the common transactions are very small and where the standard of living is very low. Early in the present century gold became the sole standard of the great commerce of the world, and the unit of value of the great commercial or machine-using nations of the world is of necessity becoming adjusted to that standard.

Having thus submitted a concise statement of what appears to be the origin and development of money, we are now led to the question of the origin of legal tender or the application of the force of law to the circulation of money.

My first hypothesis was this: When money consisted of a fixed weight of metal, could any one have conceived any reason for an act of legal tender, or forced acceptance of such money? A tender may be made of any article in liquidation or fulfilment of any agreement either for money or for goods. If that tender is consistent with the previous agreement, no force is required to assure its acceptance. If, however, goods tendered are not apparently of the quality agreed upon, the tender may be refused, and the buyer may then enforce his agreement upon the seller to deliver what he had agreed to. If, on the other hand, goods which are of the quality named in the bargain are refused, the seller may enforce their acceptance at law and may recover their value in money, perhaps with damages on account of delay. But the conception of legal tender in its application to money has in modern times invariably been to force upon a creditor money of a different kind from that which had been agreed to be paid by the debtor.

There may have been a reason for legal-tender acts in the early history of coinage a little different from this. Coinage was not then the sole attribute of governments. Private coinage as well as public coinage existed. Coins of the same name and therefore of the same nominal value varied greatly in the weight of metal. The people had no means of discriminating and they were defrauded. Under such conditions an act of legal tender may have had a very true purpose, to-wit, establishing a standard coin of true weight and compelling all persons to liquidate all debts, bargains, or agreements in coin of that standard or in its equivalent, ascertained by weighing all the various coins in circulation.

The first record of an act or decree of legal tender appears to be in the time of Solon. It is held by some students that his action was governed by the latter motive, namely, the establishment of a true standard and the equation of all kinds of money at that standard. But, on the other hand, it appears that Solon did in fact de-

base the coinage of the Grecian drachma by twenty-seven per cent., thereby relieving farmers whose land was under mortgage with penalty of slavery in case of default of payment, from a part of the danger of their position. In other words, he decreed a partial settlement of farm-debts in bankruptcy. From that date to the present, so far as one can learn from the rather obscure records of monetary history, nearly if not quite all acts or decrees of legal tender have been put in force for one of two purposes. First, in order to defraud great masses of people of a part of their dues; second, in order to collect a forced loan from the great body of the people, even without their knowledge that they were being taxed in a very unjust and unequal manner.

The purpose of the legal-tender acts of 1862 and 1863 was to collect a forced loan for the conduct of the war; justifiable, if at all, as a war-measure. The purpose of the legal-tender act of 1878, known as the Bland Silver Act, and of the legal-tender act of 1890, known as the Sherman Silver Act, was to collect a forced loan for the purchase of silver bullion, to the great injury of the mass of the people and to the sole benefit of the owners of silver-mines. These acts are condemned alike on every principle of justice, of public law, and of political economy. Their evil effect has been lately impressed upon the country by disaster and by a paralysis of industry and of constructive enterprise, accompanied by the compulsory idleness of great numbers of people in the midst of an abundance of everything that makes for welfare and prosperity.

A perfectly suitable purpose of legal-tender acts, not affecting the general question, consists in the provisions for maintaining the circulation of subsidiary coinage or small change. Such enactments are very modern, but I cannot give the exact dates of their origin. Under their provisions, coins of small denomination, of silver, copper, nickel, and alloys, which are not of full value, are maintained in circulation by provisions enforcing their acceptance for very small sums, coupled invariably with other provisions for their redemption in round sums in the standard unit of value of the nation or state in which they are circulated.

The necessity for such acts of limited legal tender in respect to

subsidiary coins was developed on the failure of efforts to make all coins of silver and gold of various denominations circulate at a legal ratio when the market ratio of the bullion was not the same.

It now seems to be very plain that nations are reaching the end of the efforts which have been made during the last five centuries or more to promote the circulation of gold and silver coins of full legal tender at a fixed ratio under what is called the bimetallic system, such efforts having invariably failed.

It is very difficult for busy men who have but little time for the systematic study of history to trace the influence of commerce and the development of money, presently supplemented by the modern expansion of credit. Masses of people have as yet only a partial comprehension of the truth that the people of the world are interdependent, and that by way of trade and commerce, all who join in it, whether men in their individual capacity or men organised into states or nations, serve each other's needs and supply each other's wants to the end that all are benefited alike. There are excellent books upon the development of the commerce and of the fiscal legislation of separate countries; there are chapters in various histories, otherwise dealing mainly with military and political events, which throw light upon the potent influence of commerce and industry throughout all time; but as yet the true history of commerce and the development of the idea of mutual service remains to be brought into one standard work, capable of being easily comprehended by every-day people.

A very active discussion of the monetary question in recent years has led to several works being placed at the service of the public, from which I have been able to formulate this treatise upon the philosophy of money, hoping that one more competent will take up the same line, developing into a full history the ideas which I am only capable of presenting in a very insufficient manner. I can only give the reflex of my own observations and reading.

One can readily picture in his imagination the very beginning of trade,—the time when men first ceased to prey upon each other, presently organising into tribes for mutual support, each tribe seeking to subdue the other. Next we can imagine the time when it

occurred to some one that a man could be put to better use as a slave than to kill him after he had been captured. Presently we can imagine the organisation of the State, and as we approach historic periods we witness the organisation of nations under kings, dukes, or leaders, emperors and the like,—the mass of the people yet incapable of self-government placing themselves under the domination of the man of power in affairs and of energy, to the end that each might serve the other. Hence the establishment by almost all European States and nations of governments by privilege, rulers granting rights to the common people. That system is now culminating in universal militarism, as impossible of being sustained many years longer as it is incapable of being removed without probable revolution or in any event fearful social disorder.

From the early beginning of an exchange of services one derives an idea of the necessity of the invention of money,—of its development somewhat on the lines which I have so faintly pictured,—of the gradual survival of the most suitable substances for monetary purposes; the whole course passing from simple beginnings through to the utmost complexity, now again verging toward simplicity on a scientific basis.

It will be remarked that gold was the first metallic unit of value. It held pre-eminence for many hundred years before and after the date of the first system of coinage which was 700 B. C., down to the beginning of the Dark or Middle Ages. Throughout the Dark or Middle Ages monetary history appears to be almost a blank. It is evident that gold disappeared from use. During the great Renaissance and the revival of commerce on a broad scale by the Italian republics the necessity for a better and more uniform standard than silver and copper asserted itself. Gold coinage was resumed,—first by Florence, subsequently by other Italian republics; from that new point of departure the coinage of gold spread over Europe.

At the period of the great commercial supremacy of the Netherlands all kinds of money were brought into Holland. They were there rated by weight and their relative value was published very frequently in a series of official documents named *platkaats*. Hence

it followed that Holland kept itself free for a long period of all the difficulties which afflicted other countries in the futile attempt to keep gold and silver at a parity at a fixed or legal ratio.

It would be impossible in the limits of this article to picture this long and weary struggle to establish value by law. One reading of the effects of the alternate drain of gold or of silver from one country to the other and of the social disturbances which were caused by these changes—coupled with frequent acts of legal tender for the debasement of coin—cannot help wondering whether one of the most potent causes of war and of rebellion may not have been overlooked. It was perhaps even more potent than the effort to establish religion by law.

Presently England attained supremacy in international commerce through the possession of the paramount control of coal, iron, and steel. As her commerce developed, the evil effect of the effort to maintain the double or alternate standard of silver and gold was disclosed to the end that in 1817 England became a mono-metallic country, establishing a unit of value under the name of "pound sterling," under which name a title passes to 113.0016 grains of pure gold.

There is no lawful coin of Great Britain named a "pound." The coin which is the equivalent of a pound sterling when of full weight is named a sovereign. There is a five-pound (not pounds) coin and a two-pound coin authorised by law, but they are not of general circulation.

Gradually but surely the unit of value under the name or title of "pound sterling" has become the standard of international commerce. It will be observed that international commerce is free of the interference of acts of legal tender. Drafts drawn or obligations incurred under the title or name of pounds sterling can only be satisfied by payment in so many multiples of 113.0016 grains of pure gold; otherwise bankruptcy ensues. It is through the stability and safety of this unit of value that London has become the banking centre of the world and that England dominates the commerce of the world.

This country undertook to keep gold and silver coin of full

legal tender at a fixed ratio in joint circulation from the date of the establishment of the mint and the enactment of the first acts of coinage and legal tender down, as I recall by memory, to the year 1835. That effort failed with us as it has failed everywhere.

The act diminishing the weight of subsidiary silver coins and limiting their tender practically put this country on the single standard or unit of gold. This fact was recognised in the act of 1873 by which the gold dollar weighing twenty-five and eight-tenths grains, nine-tenths fine, is declared to be the unit of value of this country.

The difficulties and disasters ensuing from the effort to maintain the legal parity of gold and silver in spite of the varying market value of the bullion brought all Europe to the discussion of this question many years since. Beginning with Germany in 1871, all European nations have, I believe, without exception been forced to adopt the single standard on a gold basis.

Under the acts of 1878 and 1890 this country has made another futile attempt to keep gold and silver at a parity by legislation. A forced loan to the amount of about five hundred million dollars has been collected in order to sustain that effort, all of which has been or must be paid from the public revenue derived from taxation except that part which may ultimately be discharged by the disposal of the silver purchased at whatever its market value may be.

The effort has lately been made under the name of Bimetallism to secure by treaty an international legal tender, under which the people of one state or nation might force the acceptance upon their creditors of money made either of gold or of silver while the creditor nation may be deprived of any choice in the matter. That undertaking has not met with any general approval and is evidently dying out.

The study of the history and philosophy of money leads to a conclusion which may be summed up in a few words. There is and can be no absolute standard of value because the valuation or estimation of each subject and of each instrument of commerce rests upon the determination of each individual and of each commercial community. Duality in a unit is unthinkable. It is necessary that there should be a unit of value possessing the greatest stability and

uniformity that is possible under the varying conditions of the world. By process of natural selection the metal gold is established as that unit, and to that condition all commercial nations must of necessity adjust their own financial systems. These conditions, which can be traced from a period before there was any conception of statute law in the modern sense, before any metal had been put to monetary use, before coinage had been invented, before banks had been established, and before credit had become a prime factor in the conduct of commerce, have been developed from time to time, holding their sway in spite of adverse legislation, decrees, and treaties, and not by means of them. Those nations, notably the Italian republics in their early days when the Bank of Venice was first established, the Dutch Republic, and lastly the English nation, who have first recognised the force of these conditions and their controlling influence, and have adapted their monetary systems to them, have held the paramount position in commerce, manufacturing, and industry, as compared to all others.

Portentous changes are now in progress. The dominion and paramount control of the deposits of coal and iron have passed over from Europe to this country. The influence of that fact may not yet be comprehended, and our progress may for a time be retarded by uncertainty as to what our unit of value is to be ; but when the unit of value of this nation is established on as sure a basis as it will be when the dollar made of gold is the single standard and only money of full legal tender, the power of this country to carry the abundance which may be brought forth under a system of government whose motive is peace, order, and industry, will place the people of this country in the very fore-front of those who may serve the needs of the world under the beneficent influence of commerce.

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IN SEARCH OF TRUE BEINGS.

IF I MEET a philosopher for the first time and wish to learn at once what kind of a philosopher he is, I ask him frankly: What do you think really exists? If he answers sincerely, he can give only one of two answers. At least, I have met only two answers to this question worth mentioning. The *individualist* says: "*I* do most really exist, and besides me other beings like myself." The *universalist* answers: "Only the *whole* does really exist, and I am but a manifestation of being." The universalist is the most diversified species of the two. He appears as an idealist in Plato and Hegel, as a materialist in Democritus and Epicurus, as a pantheist in Spinoza, as a pessimist in Schopenhauer, as a socialist in the modern society. He feels himself always dependent on something else, on ideas, atoms, God, society; he never admits that he is himself a true independent being. In politics he advocates the omnipotence of the State, in economics the monopoly of production, in religion obedience to general laws fixed once forever, obliging every individual to give up his individuality; in psychology he denies free will, and if he chooses to be consistent he never admits personal immortality. This universalism is so strong by its secular tradition that individualism has frequently lost its best advocates through universalist suggestion.

Descartes, who began with individualism, ended in acknowledging a "*concursus Dei*" in each act of our soul. Leibnitz also could not get over the difficulty of interaction without *harmonie pré-établie*. The whole history of philosophy is full of such contradictions between the individual's independence and God's omnipotence. Then there are radical individualists, who bring individualism

into discredit by staining it with boundless egoism, as for instance *Nietzsche*, who thought his own true existence incompatible with the existence of others, and is gone mad in the struggle for infinite self-assertion.

There is one nation on earth which has given a very strong expression to individualism and to the recognition of the rights of a minority. The Poles, while they were independent, thought that if a law was not unanimously accepted by all, if it seemed wrong only to one of them, it ought not to be recognised as law in a free nation. According to this conception of freedom they framed a constitution unique in history, in which the veto of each member of Parliament was alone sufficient for suspending indefinitely the decisions of all the others. Unanimity was the condition of every decision which was to be obligatory for all. This strange and elsewhere unknown recognition of a minority of one, led Poland to anarchy and to the loss of political independence, but it remains for the whole of mankind an ideal realisation of individualism.

This explains why individualism nowhere found more typical representatives than among the Poles. The Polish poet Mickiewicz says in one of his greatest works to the Christian God :

"My strength came thence, whence thou hast taken thine, nor do I fear to lose it."

How difficult it is for universalists and individualists to understand each other, I had many opportunities to see, but never so fully as when I met at the Parliament of Religions in Chicago with an overwhelming majority of universalists from all parts of the world. They asked me what was my faith, and I could not answer by some well-known name, because I had never met with an adequate expression of my Polish individualism in the works of foreign philosophers. Remembering those questions of my friends, the universalists, with whom I had infinite discussions two years ago in Chicago, I shall try now to state in a short and clear way what is the teaching of our Polish fraternity, a church without holy books or authorities, but with the strongest faith on earth.

I do not recognise any power nor any form of being above the individual, nor do I *know* anything about an almighty, omniscient,

perfect Being. The being I know best is myself—then other human beings.

I know also that I have the power to influence other beings, and that I am influenced sometimes by others. Some of my actions are, so far as I am conscious of, not caused by myself, and as I do not admit unconscious causation, such actions must be caused by some beings outside, if not by living men, then by invisible spirits, one of whom may be called God, if we suppose him more powerful than the others, without any necessity to recognise his omnipotence.

Such an idea of God as a being like myself is entirely different from the traditional notions of an almighty Creator. Still my true position respecting the Divinity is more a suspension of judgment than a frank denial. I have never met God, nor have I known him as a distinct personality. I leave it open whether he exists, though I am inclined to doubt about his being my Creator.

I think I cannot have been created at all, because creation implies a beginning in time, and time is only in my thoughts. True beings like myself are independent of time, because the existence of time itself is conditioned by their existence.

Time and space are within me ; I could not be a true being if I were like matter in time and space. Other beings, in so far as represented by me, are phenomena, and seem to be in time and space. I can look at myself in my relation to others as to a phenomenon in time and space, but for myself I am a real substance, outside time and space.

I do not deny succession of states in myself, but succession is not the same thing as time. There is no reason why a simple state of my mind should last any length of time. No state of mind, no psychical act requires time to be completed. Only physical movements occur in time. Psychical movement goes on without friction. In less than a second I can psychically live a life ; a century of human chronology may be for my mind a single thought.

My life is a succession of events, and is not determined in advance, because I recognise my *free will* as the chief factor of my acts, and I am conscious of my faculty of choice at every point of my life.

I am sure to have a perfect knowledge of my persistence after death, and I think that people who speak about immortality without feeling themselves uncreated are in contradiction with themselves. Anything that had a beginning must have an end : it is not given to an ephemeral creature to be immortal. If I feel myself immortal, it is not because some God made me such, but because if I were not immortal, I could not be a true being at all. The mere fact of my being implies my eternal being, because anything that can be destroyed, has only an apparent existence, due to something else indestructible.

As the naturalist imagines everything built of atoms and thinks those atoms to be the true components of each material appearance, a metaphysician reduces the atom itself to its true cause, the conscious monad, able to represent atoms in her mind and to frame space and time for the movements of those imagined atoms.

Many times I have discussed my existence with different adherents of universalism, materialists, idealists, pessimists, socialists, pantheists. At last I came to the conclusion that they might be right for themselves and wrong as to my existence and the existence of other true beings. They say they are only manifestations of something else : atoms, ideas, God, society, the universe. Perhaps they are such manifestations of a being unknown to me, but I know myself to be a true being, the most certain being I know of. I let them be what they pretend to be, and expect sometime to make the personal acquaintance of that mysterious being, their master. But I defy him to become my own master : I shall resist his power like Shelley's Prometheus did that of the old Jupiter, "with a calm fixed mind." I do not hate him, nay, I look at him as my friend, because we have to a great extent the same aims and also many common enemies.

The servants of that mysterious being, called God, say that they love mankind, and that they do so by his order. I love mankind, truth, beauty, not because it is God's will, but only because it is my own free pleasure. I act according to my ideas of duty, not imposed by any other being but by my own considerations of the results of my action.

I am confident, that those aims, which are the aims of my will, can become the common aims of all beings, and that makes their power.

As to the mystery of interaction between the beings, of my partial influence on others and the influence of others on me, I prefer frankly to confess that I have no explanation for it. The hypothesis of a *concursum Dei* or *harmonie préétablie* seems to me no explanation at all. It is useless to explain a common experience by some very uncommon and obscure hypothesis. The whole problem of mutual influence, as it is contained in the smallest movement of my body, remains entirely the same in the supposed action of God on men.

If Descartes or Leibnitz understood how God could create or act, I think they could understand in the same way their own action on others. But they seemed not to be quite sure of their own existence, and thought that God's existence and action was easier to understand. They were parts, manifestations, or servants of their God—I am my own Lord. I do not deny the power of their Master. He may act on millions and millions of his servants, sometimes on myself, but I know he does not *always* act on me, I *can resist* his actions if I wish. This certainly leads me to the indisputable knowledge of my true immortality—not the vague immortality of universalists, but a living immortality,¹ a true eternal continuation of myself, with everything that makes up my personality: memory, affections, the same aims and increased power.

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¹On the subject of immortality see my article in the April number, 1895, of *The International Journal of Ethics*, and another in the December number, 1893 of *The Journal of Speculative Philosophy*, being the publications of a lecture held in Chicago during the World's Fair.

FROM ANIMAL TO MAN.

THERE was a time when science was content to confine herself to inorganic nature. Life was a mysterious principle unrelated to the forces of nature and therefore a field for philosophic speculation, but not for exact knowledge. But this region has already been subdued by science. Already life is correlated with other forces of nature, and biology has fairly entered the ranks of progressive sciences. And now at last the border which seemed so long to separate impassably biology from psychology has also been crossed by science in her daring march. Here at last we touch the highest phenomena, and science seems identified with philosophy in subject-matter if not in method.

My object now is to touch some points in this borderland, but only briefly and lightly in the way of suggestion. What I now say may be regarded as a continuation of the lines of thought suggested in my previous writings on the relation of man to nature and especially to the animal kingdom. In these previous writings I try to show that, without violating the analogies of nature we may conceive the spirit of man as having arisen by progressive individuation from the forces of nature. That it existed first in inorganic nature as a potentiality, in plants as a germ, in animals as an embryo, which finally came to birth in man. In this paper I wish to fix attention on this last change and show in what it consists. I wish to show what is the essential difference between the spirit of man and the *anima* or soul or intelligent principle of animals.

This question lies at the very basis of philosophy. It is the question most fundamental of Locke, Hume, and Kant, viz.: the origin of knowledge from sense-impression. It is more: it is a

question which touches the origin of all that is characteristic of man—art, language, society, morals, religion, science—and is thus closely bound up with all our dearest hopes and noblest aspirations. But under the new light now shed on every department of thought by the theory of evolution, it must be approached in a new way and investigated in a new spirit. For if this subject lies at the basis of philosophy, it is now shown also to form the very summit and crown of all science. If ever we are to have a comprehensive and rational philosophy of nature and man, science must solve this question.

In the past, man, body and spirit, has been studied too much apart from nature. Thus the anatomy, physiology, and embryology of man were separate sciences. This is no longer possible. The comparative method is the great method of discovery in all the more complex departments of science. This method has been successfully applied to all that concerns the human body. The time has come when it must also be applied to the human spirit. Anatomy did not and could not become scientific until it became comparative anatomy; physiology and embryology until they became comparative physiology and embryology; so also psychology will never become truly scientific until it becomes comparative psychology,—until the mind of man is studied in relation to those foreshadowings and beginnings of mental phenomena, which we find in animals and in infants. This is just what psychology is waiting for to-day.

But there are two opposite dangers against which we must guard. The older thinkers saw an infinite gulf between man and animals and therefore thought lightly of the apparent likenesses. Modern science, on the contrary, recognises and rightly insists on the resemblances, but seeks to minimise the differences. Now the only rational attitude is to admit with the evolutionists the close resemblance and even genetic connexion, and with the older thinkers the enormous differences; and then try to reconcile these two very diverse facts.

Admitting then both the close resemblance and the immense difference, admitting also the genetic connexion—the one having

come out of the other by a process of evolution, I wish to show in a general way in what consists the essential difference—to put my finger as nearly as I can on the dividing line where humanity emerges out of animality.

This I know is a difficult problem. The acutest minds have striven in vain to solve it. I am not so vain as to imagine that I can do so completely. It can only be done by a profound critique combined with far wider and more accurate knowledge than we yet have of the psychical phenomena of animals and of infants. All I can hope is to contribute something, however small, towards its solution, by bringing forward an assemblage of differences each one small at first, but a germ from which something distinctive of humanity seems to grow; each one perhaps unsatisfactory by itself, but each strengthening the others, and therefore all together convincing; each in some sense similar to all the others and therefore strongly suggestive of common origin. Of these several differences, we take up first those which seem simplest, in the hope that these will furnish a key which will help us to understand the others.

I. SPEECH.

This has always and justly been regarded as one of the most important distinctive characteristics of man and some make it the one essential distinction from which all others arise. But dogs may be taught to understand human speech and parrots may be taught even to speak intelligibly. Now, what is the difference between such parrot speech, or better, between human speech as understood by a dog and the true rational speech of man? Some will doubtless say that parrot speech is mere succession of imitated idle sounds signifying nothing—associated with no idea or object in the mind of the parrot. But I am sure those who have observed closely will agree with me in thinking that in them, words and phrases are sometimes associated with objects and actions. When she says, "Polly wants a cracker," she means what she says. When she says, "Bring in breakfast," she expects food to be set on the table. Amid much idle repetition, there is certainly often a dim association of word and thing. What, then, is the difference between this and

human speech? I answer in brief: It is just the difference between sign-language and rational speech; meaning by sign-language all movements or sounds which by repeated collocation become associated with things or actions or emotions.

Sign-Language Versus Rational Speech.

All the higher animals have their cries of fear, rage, and pain, or notes of pleasure, joy, and love. Social habits, in default of notes, necessitate other and more elaborate means of communication. Ants, for example, undoubtedly exchange information by touching antennæ. The sign-language of deaf-mutes is mostly the same, although the rational human mind always puts something more into it. The alphabetical sign-language of mutes is of course of a higher order and a strictly human sort.

Now, words as well as gestures may be only signs; and speech may be only word-sign language. Words may be only the signs of things, so that by frequent collocation the word suggests the thing and the thing the word. This is the best that can be said of parrot-speech or of the speech of man as understood by the dog. Such speech does not differ except in degree from the movements of an intelligent dog who wishes to make known his wants to his master, or the sign-language of an ant who tells his fellow of a fortunate find. In this sense all animals talk. It is true that in the case of the parrot the words and phrases have been learned; but by frequent collocation of words and things the two become associated in the mind so that the words are no longer idle sounds.

But it will be asked, Is it not the same with all language? Does not the child, too, merely learn the words, and, by practice, to utter them? Does not the child, too, by frequent collocation of word and thing learn to associate them? Yes, true. All the speech of earliest childhood is nothing more than this word-sign language, this imitative parrot-speech. But true rational speech is different; and if we watch closely we can observe in the history of every child, the one kind change into the other. The process is as follows:

The child by frequent collocation learns to associate certain words with certain things, and *vice versa*, then to use the words as

signs of the things ; then a phrase (to him only a long word) to indicate a certain action. This is all parrot-speech, although far more perfect than that of any animal. But at a certain time, sooner or later, there comes something more, not only more perfect, but different ; not only a growth, but a birth. At a certain time the child perceives the power of words in *relation* to one another. This is a perception, not of a thing, but of a relation. Or if we call it a thing, not a material, sensuous thing, but an intellectual thing. He analyses phrases which before were to him only long words, and perceives the power of each part in relation to other parts. Immediately he is able thereby to make new, untaught combinations. He invents new phrases, creates original sentences. There is now for the first time a grammar in its language. There is no longer any limit now to new combinations. Some of these new combinations give rise to strange and even laughable phrases, which are repeated by the fond mother as the smart sayings of her darling.

Now just here true rational speech, characteristic of man, begins. All else follows as a necessary consequence. Words are combined into phrases, phrases into sentences, sentences into paragraphs, and paragraphs into the most complex pieces of thought-work. But all before this is mere sign-language, not differing except in degree from that of animals. Many animals, especially the dog and the monkey might be taught such language if their vocal and articulating organs were suitably formed ; but the second stage no animal can attain, for want of the mental faculties necessary.

As word-sign language, so gesture-sign language may become rational by the presence of the necessary mental faculties. Thus the sign-language of deaf-mutes may be truly rational, being informed by the rational mind.

The difference here pointed out between word-sign language and rational speech is similar to, and may be illustrated by, the difference between written and spoken language. As in rational speech, the phrase-word is analysed into its component words, and the separate powers of these components in their relation to one another is perceived ; so in written language the analysis goes one step farther, and each word is analysed into its component sounds,

and the power of each sound in relation to other component sounds is perceived. The first analysis is connected with the birth of human reason ; the second with a higher stage of culture only.

I leave to others of greater acuteness to follow up the distinction here pointed out. My object now is to give a whole assemblage of similar distinctions, each one only in outline, trusting to their combined effect for the conviction I seek to produce. I wish to show that in all the faculties of the human mind as compared with the corresponding one in animals, there is a distinction similar to that already pointed out.

II. USEFUL ART.

The gradation between the constructive art of animals and the lowest art of man is very complete. It is, therefore, more difficult to draw the line sharply here. Yet a little reflexion will show where it must be drawn and that it is of the same kind as that already pointed out under the last head.

The constructive art of animals, as shown in the nest-building of birds, the dam-building of beavers, the complex galleries of ants, the hexagonal honey-cells of bees, is apparently only the final result of a succession of blind, divergent trials and survivals of best methods, continued through successive generations, and conserved in inherited brain-structure, until a really marvellous excellence is sometimes attained. The successive improvements under such blind trials and survivals seem to be wholly unconscious and unintentional, and, therefore, exactly like the improvement of the organism itself under divergent variation, struggle for life, and survival of the fittest. It is, in other words, unconscious evolution of constructive methods. This is what we call instinct, and it is in this way that the most wonderful instincts have been gradually formed. That we have rightly interpreted the significance of such art is shown by the fact that its excellence is in no wise proportional to intelligence, but rather to the fixedness of habits and the narrowness of the line along which improvement has taken place.

But the constructive art of man, even the rudest, has always another, a reflective element. In man's work there is always a dis-

tinct conscious purpose or idea which he deliberately tries to attain. Furthermore, there is always in man a perception of law: unconscious, intuitive perception it may be, i. e., perception by methods which he does not stop to analyse and could not analyse if he would—but still a dim perception of the laws of nature underlying his work. In art, as in all else, man is always inventive—creative; and even the inventive genius of a Watt or an Edison is only a higher form of that which distinguishes man, even in the lowest stages, from animals.

But here again, in art as in language, we find on the human plane two grades, and the distinction between these two grades is perhaps more easy to draw than between the human and the animal. The two grades referred to are empiric art and scientific art. Empiric art is the result of dim, unconscious, intuitive perception of law; scientific art, of the clear, conscious perception, the rational knowledge of the laws of nature. Man originates and improves art by incessant trials, not indeed wholly blind, as in animals, but guided only by the dim light of intuitive reason. By this method alone, through successive generations and perhaps aided, as in the case of animals, by inherited capacity, a high degree of excellence may be attained. But sooner or later such art is arrested and either petrifies or decays. But if under the stimulus of such art science be once awakened, then the principles underlying the work are analysed and understood, and art becomes scientific and thereby becomes endowed with a new and higher life and thenceforward indefinitely progressive. Thus in this as in all, there is for man a human life and a higher life. The one separates him from animals, the other separates him from his lower self.

III. FINE ART—MUSIC.

I suppose most persons would say that it is in music—bird-song—that we find the nearest approach to man. Who has not been charmed by these songsters of nature? Who will deny that the pleasure we thus derive is really of a very high order? But the very fact that it is of a very high order ought to make us suspect that its source is all other than is usually supposed. There is, I am con-

vinced, a profound difference between bird-song and human music, and that the pleasure we derive in the two cases has an entirely different source. I would go farther and say that, as the speech of parrots is no true rational speech, so the song of birds is no true music; it has no real æsthetic quality in it. Let me explain.

Beauty versus Sense-Agreeableness.

Sugar affects our gustative nerves agreeably, and quinine disagreeably. But no one would think to call this pure sense-pleasure beauty. So odors affect us with pleasure or pain, but no one would think of dignifying such pure sense-pleasure with the name of beauty; because these lower senses are not closely connected with the higher faculties of the mind. But in the higher senses, so close is the connexion between sense-pleasure and the higher emotions, that the two become confused in the popular mind, and, therefore, in popular language. Thus we often speak of a beautiful sound or of a beautiful color, whereas the proper word is sweet; for the pleasure derived from a pure sound or a pure color is on the same plane as that derived from sugar. It is pure sense-agreeableness, and nothing more. But take two colors, place them side by side, and compare them. Now something more and higher is at once perceived. Each color, as before, affects us agreeably (sense-pleasure), but in addition we perceive the *relation* between, whether of concord or discord. This is an intellectual perception, not a sense-perception. It is a perception of a relation, not of a thing. The effect is not on the plane of sense, but on the plane of mind. Here, then, is the simplest possible perception of beauty,—beauty reduced to the simplest terms. The harmonious combination of color with color, of form with form, and these two again with one another becoming more and more complex, and therefore higher and higher, constitute the whole art of painting.

So also is it with music, and the principle is best illustrated in this department. A simple sweet sound produces in us, not the feeling of beauty, but only a sense-pleasure. The æsthetic emotion, the so-called sense of beauty (see how hard it is to avoid the language of sense) is and must be at least one step removed from the

plane of sense. But suppose we make two sounds, either consecutively or together. Now we perceive, as before, each sound (sense-perception), but we perceive also something else which is not sense-perception. We perceive the relation between the two sounds, whether concordant or discordant. If concordant, we call it harmony, consecutive or chordal. This is beauty or æsthetic feeling reduced to its simplest terms,—the simplest elements of music as distinguished from mere sense-pleasure. These simplest harmonies are then combined into musical phrases, phrases into strains, strains into songs, and songs into the most complex choral or orchestral music. As the relation becomes more complex, the result is removed more and more from the plane of sense, becomes more and more intellectual, but also more and more difficult to appreciate without long culture.

The outcome of the whole argument is this: the simplest element of beauty is still one step above the plane of mere sense. It is an intellectual perception, not a sense-perception. It is a perception, not of a thing, but of a relation; or, if we must call it a thing, then I would say that it is the perception of an intellectual thing, not of a material thing. As art becomes higher, the perceived relations become more complex and difficult to grasp, the intellectual thing becomes more and more removed from the plane of sense.

It is easy now to see why true art is confined to the two higher senses. It is because of the great variety of the sense-impressions in these and therefore the complexity of the relations amongst these impressions. It is conceivable, however, that there may be a low kind of fine art connected with these lower senses of taste and smell. It is possible that by a skilful combination of tastes with tastes and smells with smells, and these two again with one another, the arts of cookery and perfumery may rise one step above the plane of sense. If so, we would not advise a special cultivation in the enjoyment of this art; because from the dominance of the sense-element there is danger that the intellect may be dragged down toward the plane of sense, and thus debased, instead of the senses raised toward the plane of intellect, and thus refined; which I need not say is the true end of art.

Application.

But to return and apply these principles,—I do not believe that birds either make or appreciate music in the sense above defined. I am aware that many think differently. I know that some have even attempted to set bird-music to scale. But for myself, although I have a very keen appreciation of harmony—and perhaps for that very reason—I have never been able to assure myself of any true purposive harmonic relation among the consecutive notes of bird-song. Sometimes there seems to be, and sometimes not. When there is, it seems to be accidental and unintentional. The very best that we can accord to bird-music is what we have already accorded to the constructive art of animals. It is probable that by blind divergent trials and survivals of the sensuously best or most agreeable results, continued through successive generations, not only have the notes of the birds become sweeter, but also perhaps some simple harmonic relations may have been attained; not, however, because such harmonic relations were perceived and enjoyed as relations, but because there is probably also a sensuous element, a sweet nerve-thrill in harmonic vibrations. In any case, even those who think that they perceive real music in bird-song must admit an enormous difference between it and human music. Sing it, play it on an instrument and see if we derive any pleasure at all from it. The difference is fundamental. Man creates combinations of sound purposely and indefinitely. He combines sounds into chords, chords into phrases, phrases into strains, strains into songs, and songs into choruses. Birds never reach beyond simplest phrases, and these not created but learned and repeated or else inherited, and even so only sensuously not æsthetically enjoyed.

I have often in early life and once again recently listened to what might be called choral music in birds. The red-winged black-bird and our western meadowlark, often in great numbers sing together filling the air with their “sweet jargoning.” But although the effect was delicious I could not detect any real concord. It was after all only sweet jargoning. The pleasure was evidently of an

entirely different order from that derived from music ; and similar to that derived from the sounds of nature, such as the rustling of leaves or the murmuring of streams.

But the question again returns whence then the exquisite delight we derive from the song of birds? Why the ecstasy of poets over the skylark and the nightingale? And why do we, who are not poets, but love poetry, sympathise so deeply with the poets in this regard? I will try in homely fashion to explain the real source of this pleasure.

Suppose then all conditions favorable, bright spring-morning, romantic spot, deep woods, and murmuring stream. Suppose farther the ubiquitous small boy with glass-tube whistle and tumbler of water, hidden from view and trilling the joyous notes of the canary. It is easy to imagine our rapturous delight—a delight intense and pure and just in proportion to the refinement of our nature—so long as we are deceived ; but all pleasure immediately vanishes as soon as the imposture is detected. But why? If there be any real music in bird-song, we ought equally to enjoy the whistle. But, on the contrary, all that is left is some sense-pleasure of sweet sounds and perhaps some intellectual pleasure from clever imitation, but of æsthetic pleasure there is not a trace.

What is the source then of the high delight in bird-song? Some sense-pleasure of sweet notes doubtless, but what else is added, elevating, refining, ennobling this sense-pleasure? I answer, not æsthetic pleasure of music ; but sympathy with joy, with happiness, in the humblest of God's creatures. There is nothing nobler, higher, purer than this sympathy with nature in all its aspects and sounds, with murmuring streams, rustling leaves, and singing-birds. It is the sympathy of the spirit of man with the infinite spirit of nature which is the spirit of God in nature. But its noblest form is sympathy with happiness in animals ; for animal-happiness is the harmonious activity of the whole being according to its nature, and is therefore the symbol of that higher spiritual happiness which is the holiness, the blessedness, after which we all sigh. The pleasure above mere sense which we take in the songs of birds is of the same order as that we take in any exhibition of pure animal-joy ; in gam-

bols and skipping of lambs, the mad bounding of colts, and the merry laughter of children. If we call it music, then it is the grand chorus of nature in which bird-song is but one single note.

But if there are those who would object to this view, and would make bird-song a real music, thus lifting birds into the human plane in this regard, there are not wanting others who would accomplish the same result by dragging down human music, indeed everything human to the plane of the animal. Many of the materialistic school of modern philosophy insist that all music is on the plane of sense,—is naught else than successive pleasurable nerve-thrills,—and that harmony or what we call a perception of relations is but unison of nerve-thrill with nerve-thrill to form a still more delicious compound-thrill. The answer to this is plain. In consecutive harmony, the combination occurs in memory only and therefore no compound nerve-thrill is possible. Again, what shall we say of the ecstasy of deaf Beethoven while composing his exquisite symphonies. Is this nerve-thrill? Thrilling of the auditory nerve in the deaf? Is it not rather soul-thrilling?

I need hardly say that the pleasure which some animals seem to take in human music, if they take any, is of a purely sensuous kind and not at all æsthetic. It is an enjoyment of sweet sounds, not of harmonic relations; it is delicious quivering of nerves, not a thrilling of soul.

What I have said of music applies, *a fortiori*, to all other forms of fine art. Music is the simplest and most fundamental of all arts, although for that very reason most highly developed. It is not pretended that other forms are found among animals, or possible for them.

IV. THOUGHT.

Thus far we have spoken of sensible results; of characteristic manifestations of human activity in language and in art, both useful and fine. We come now to speak of the powers underlying and determining these characteristic results.

Perhaps in no department has there been so much discussion as to the relation of man to animals as in the department of thought.

What is the relation of instinct and intelligence in animals to reason and thought in man? What is the origin of rational knowledge so characteristic of man? These are among the deepest questions of philosophy. I can, of course, touch them only in the lightest way, but as I touch them from the scientific side, I hope not without addition of some new light.

First of all, to make myself intelligible, it is necessary to distinguish between instinct and intelligence in animals. And then we shall be better prepared to distinguish between animal intelligence and human intelligence or reason. It is with this latter distinction that we are chiefly concerned.

Instinct Versus Intelligence.

It is common to imagine that instinct and intelligence are two corresponding but mutually excluding endowments, the one characteristic of animals, the other of man. But nothing is more certain than that both of these coexist all along the line from the lowest animals up to man; although in varying, almost inverse proportions. In man and animals alike there is a variable and an invariable element in conduct or activity. The former belongs to intelligence, the latter to instinct. Under a previous head, in speaking of the constructive art of animals, I said that it is the result of blind divergent trials and survival of best methods integrated by inheritance through successive generations, until the integrated sum may become large and the resulting art even more perfect than the lowest art of man. Now, the integrated sum is called instinct, while the individual additions must be credited to another and more voluntary faculty which we call animal intelligence. All wise conduct or activity adapted to ends is the result of experience; but the experience is partly individual and partly ancestral or inherited. Of the whole experiential wealth, the inherited bank-account belongs to instinct, the individual acquirement to intelligence. Now it is easy to see that in proportion as the conditions of life are narrow and fixed and the habits of animals limited to certain lines, in the same proportion will such activity become fixed in habits, and such habits petrify in inherited brain-structure as instinct. Thus it is

that perfect instincts are incompatible with high degree of intelligence, and therefore that in animals instinct, in man intelligence, greatly predominates. In animals the inherited bank-account is large and the individual acquirement small; while in man, although the bank-account is still large—much larger than usually supposed—yet the individual acquirement always predominates.¹

Animal versus Human Intelligence.

But there is a profound difference between animal intelligence and human intelligence or reason; a difference which is shown by the tendency of the former to integration and fixation as instinct. Intelligence, whether animal or human, works always by individual experience, but the individual experience is very different in the two cases. Experience, whether in man or animals, comes by trials; but the trials of animals are blind trials in all directions (divergent), and only by survival of the best methods is the end reached; while those of man are directed by thought to the desired end. Thus the individual acquirements of animals are the result of blind divergent variation of conduct and the survival of the best in useful habits, which habits are again finally embodied by inheritance in instincts; while the acquirements of man are the result of creative, purposeful thought. It may, indeed, be hard to draw sharply the line between the blindly experimenting intelligence of animals and the thoughtful intelligence of man, and all the more so because there is so much of the animal kind in man himself; but there is undoubtedly in man a wholly characteristic element, small it may be at first, but constituting a new departure with infinite consequences. We will attempt very briefly to indicate what is the essential nature of this new element.

Perhaps it may be put in a few words thus: animals perceive objects or things only. Man perceives also the relations and properties of things abstracted from the things themselves, and thus forms conceptions or general ideas. Comparing with music: as there is a sense-pleasure (nerve-thrilling) and an intellect-pleasure

¹ See an article on "Instinct and Intelligence," *Popular Science Monthly*, for October, 1875.

(soul-thrilling), and all true music comes out of this latter, so there is a sense-perception and an intellect-perception (conception) and all rational knowledge is founded on this latter. Or, again, comparing with language : as all rational speech is founded on the perception of the power of words in relation to one another, and therefore the meaning of words expressing such relations ; so rational knowledge is based on the perception of relations and properties abstracted from things, and this perception, therefore, must precede rational speech. External, actual things are the objects of sense, properties and relations which are *internal*, *ideal* things are the objects of thought. And this, be it observed, is only the lowest plane of thought ; for the thoughts about these relations, and the relations among these thoughts, become in their turn the objects of thought.

In a word, animals perceive things only, or if in some sense relations also, only as embodied in, as belonging to, never as abstracted from, the things. Man perceives not only things, not only relations and properties embodied in things, but abstracts these from the things and considers them separately. Animals have, given them, percepts only; man in addition forms, creates concepts also. And since such concepts are not given, but created by him, there is no limit to their number and variety. They become more and more general, more and more complex, more and more abstract as we rise in the scale of reason. Now, since all knowledge is based on concepts or ideas only, it follows that what seems like knowledge in animals is instinct, and this in its turn but the inherited sum of the results of divergent purposeless trials, and never the result of abstraction or general ideas, applicable—as all general ideas are—beyond the limits of actual experience. In other words, in all true knowledge there are two elements, an external and an internal. Nature, through sense, furnishes the material ; mind, by thought, shapes, lays, and cements according to a plan or idea. Now, animals are slaves of sense ; there is no creative work of mind. Of the elements of knowledge they have but the one. They have materials, but no builder, and therefore no edifice of knowledge ; or, if a seeming edifice, it grew—was not built.

But some will object that animals must perceive relations be-

tween themselves and external things ; for how otherwise could they adapt themselves to external things? I answer : In animals there is indeed a kind of *practical awareness* of external relations, which guides their conduct more or less wisely. In men there is all this, but also something more, viz. : a clear reflective cognition of relations as relations,—of relations abstracted from the things related,—which relations thus become the objects of thought and the basis of all knowledge.

To illustrate, take, for example, number : animals distinguish one thing, two things, three things., but have no idea of number abstracted from things. Now it is from this latter alone that comes arithmetic and algebra and indeed the whole science of number. Again, space : animals perceive space occupied by objects, but have no conception of space abstracted from its contents. But geometry, trigonometry, in fact, the whole science of space comes from this latter. Again, time : animals cognise time in so far as it contains events, but not time as abstracted from contained events, yet the whole science of time or history, even history of our own lives, comes out of this latter.

V. IMAGINATION.

I think, from the preceding, we may assert that animals only re-present in the mind as images what had already been presented to it in experience. In them there is therefore only reproduction of experiences. There cannot be in them therefore a real, i. e., creative imagination. It is true, man too is limited to experience for the materials out of which he makes pictures by the imagination, but only for the materials. These materials he combines in an infinite variety of ways and thus composes pictures which may never have existed in his own or in any other experience. No such creation of pictures, by new and original combinations, it is believed ever occurs in animals.

But it will be objected, Do not animals—dogs, for example—dream and are not dreams pure creations of the imagination? I answer, though we cannot enter into their consciousness, yet we may be sure that nothing appears in their dreams which has not al-

ready appeared in their experience. In their dreams they only go over again the exciting incidents of the chase previously enjoyed. The dreams of man, on the contrary, although they too are compounded out of materials furnished by experience, yet these materials are united in an infinite variety of ways so as to form new and often improbable combinations—are woven into strange and fantastic patterns. Human imagination is literally creative always. The power of making new combinations, of creating pictures, by the imagination, whether waking or sleeping, is essentially characteristic of man ; the power of doing so with beautiful results is characteristic of genius. If the creative imagination even in its lowest form be characteristic of man, how much more must the higher form, and its beautiful result—fine art—be characteristic of him.

Reveries are but day-dreams. In a waking state we also exercise the creative imagination in constructing fantastic, improbable pictures ; only in this case we do not mistake them for objective realities as we do in dreams. We build castles in the air both waking and dreaming, but in the former case we recognise their unsubstantiality. Now if we are right in what precedes, then reveries also are characteristic of man. But if reverie then also hope, and if hope then also memory, is characteristic of man. Animals live only in the present, man also in the past and future. If it be objected that animals profit by experience and therefore must have memory, I answer : so do they provide for the future and yet they obviously have no idea of the future. Provision for the future is in them only conduct without definite purpose continued from generation to generation, because the result is good and therefore in the struggle for life prevails over other conduct—a mere survival of the fittest conduct. Even so I believe memory in them is apparent, not real. They profit by experience ; yet I suppose such experience does not seem to them as localised in the past but as present, as in their dreams. The re-presentation of a past experience is to them like a present reality, only less vivid. As they have no idea of time as abstracted from events, they cannot have any idea of a history of self.

VI. CONSCIOUSNESS AND SELF-CONSCIOUSNESS.

External objects affect the sense-organs. The impression is carried as a vibratory thrill or else as a propagated chemical change along the sensory fibres to the nerve-centre and determines there certain physical changes which in turn determine—how we know not—changes in consciousness which we call sensations, perceptions, images, etc. Immediately there is set up a return series of changes, viz.: change in consciousness which we call will, corresponding change in nerve-centre, propagated change along the motor-fibres, contraction of a muscle, movement of a limb, and changes in the external world. Thus through the nerve-system, with its receptive organs, the senses, and its executive organs, the muscles, is established action and reaction between an outer and an inner world. In animals this is absolutely all. But in man there is something more. The sensations, perceptions, images thus produced, become themselves the objects of perception and thought (reflexion), and still more, the mysterious self in which these phenomena inhere becomes itself the object of consciousness and thought (self-consciousness). Thus there is a consciousness, the objects of which are the facts of the outer world, and there is an inner consciousness the objects of which are the facts of consciousness. There is consciousness and a consciousness of consciousness, or consciousness in the second degree. There is a sanctuary and an inner sanctuary of consciousness. Now it is this higher, inner consciousness, this consciousness in the second degree, this consciousness of self, which is the characteristic of man. In the history of every child there is a time when self-consciousness emerges, or is born, out of the mere animal consciousness. At that moment it seems to me, the child rises out of the animal into the human plane.

I remember with great distinctness the time when consciousness of self first became clearly present to my mind, and the sense of mystery, the wonder, the awe it produced. I well remember the difficulty of imagining that others too felt, as I did, this infinite mystery of selfhood. With this undoubtedly comes the sense of

personal identity and therefore of continuous personal history and therefore also of true memory. Paradoxical as it may seem, I do not believe that animals have what we know as memory. Images of previous experiences are reproduced in their minds and determine appropriate actions, but the idea of personal identity and therefore of these experiences as belonging to a self, existing at a previous time, I believe is not possible; and without a sense of continuous history there can be no true memory. The proof of this is I think to be found in observation of the phenomena of infants taken in connexion with our own remembered history. There can be no doubt, as shown by Preyer,¹ that a child one year old is already advanced far above the level of any animal. And yet such a child has, I think, no consciousness of a self, no sense of a continuous history, no true memory of experiences as belonging to a self, and therefore no future or past, no memory or hopes. All this, according to my own experience and observation, comes between two and three years of age and therefore at a time when the child is already raised far above the level of any animal. If our view is correct, this is the reason why our own remembered history extends back only to about this age. It extends only over the period of self-conscious, rational, personal existence.²

If the childhood of the race be anything like that of the individual, we can easily imagine the sense of wonder and mystery produced by the newly-awakened recognition of selfhood. This accounts for the active, fantastic, but often beautiful, play of the imagination amongst early peoples.

All that is distinctive of man comes out of this consciousness of self. We have already shown how all science, all rational knowledge grows out of the power of abstraction. Now, the idea of self is an abstraction from the facts of consciousness. Moreover, it is

¹ *Die Seele des Kindes*.

² Doubtless what we call memory in animals is the embryo of true memory of man. There are in fact three kinds or degrees of memory. (1) Unconscious inherited tendencies of growth in the embryo, by which the outlines of phylogeny are repeated in ontogeny. This is *organic* memory, (2) *Conscious* memory of animals and two degrees of this, (a) instincts, (b) acquired habits. (3) Self-conscious memory, or history of ego.

the highest and most complex of all abstractions, and the necessary condition of the development of all other abstractions into clearness. It is, therefore, the underlying condition of science, philosophy, art, religion, rational organisation of society, in a word, of indefinite progressiveness. Animals cannot have it, or they, too, would have their science, philosophy, art, religion; they, too, would be indefinitely progressive; they, too, would be rational, morally responsible beings; in a word, they would in all essential respects be men.

One pregnant thought we throw out by the way and pass on. It is interesting to note here, that man rises in the scale and approaches his ideal just in proportion as he departs from the characteristically animal. In animals the whole life and activity is concentrated in the now; man, on the contrary, by memory and imagination lives also in the past and the future. His life expands more and more backward and forward, until in the ideal man he lives equally in all time, past, present, and future. He weighs in equal balance all events without prejudice in favor of the now, and is thus, as it were, unconditioned by time. This is the ideal of wise or prudent conduct—the intellectual ideal. Again: in animals the whole life is concentrated on the self, although an unrecognised self. Man—and more and more in proportion as his distinctive human nature predominates—lives in and for other selves. His life expands and incorporates more and more the lives of others through sympathy and love. He reaches his ideal in this direction, when his life spreads equally over all other lives in proportion to their real worth—when self-love no longer in the least disturbs the justness of judgment or unduly influences conduct—when self and other selves are weighed in the same just balance. In a word, when he is unconditioned by self. This is the ideal of right conduct, the moral ideal. The moral law of equal love to self and neighbor is now fulfilled. But observe: the necessary condition and beginning of this whole process of improvement is the recognition of selfhood.

VII. WILL AND FREE-WILL.

The difference in this case is similar to the last, but it is even harder to draw the line of distinction sharply, because there are many degrees of freedom with almost insensible gradations between. There is, confessedly, no subject in philosophy more difficult than that of freedom of the will. I shall not attempt to define its exact nature. My attempt will be far less ambitious, but, as I believe, far more useful. I wish to show the various degrees of freedom in animal conduct, and that the most marked of these begins with man and is therefore characteristic of him.

There are some, yea many, in these latter days, who cut the Gordian knot of this difficulty by asserting that there is no such thing as free-will, nor indeed will of any kind such as we imagine. They assert that the animal, yea even the human, body, with all its functions, physiological and psychological, is naught else but pure mechanism—the whole phenomenon of life is naught else than action and necessary reaction between the external world and the nerve-centres. If the process is attended with consciousness, as it sometimes is, then we call the reaction will; but it is none the less necessary on that account. According to these philosophers, an animal or even man himself is a pure automaton; an automaton conscious of what is going on, but wholly unable to modify the automatic phenomena. Consciousness is present, true, but only as a passive, helpless observer. This view was presented in a masterly way by Professor Huxley in his memorable Belfast address in 1874. (*Nat.*, X., 362. 1874.)

To most persons (and I believe with reason) a sufficient answer to this is an appeal to consciousness itself; but the competency of the witness is disallowed by the other party. In default of this appeal, I believe the best answer is found in the *reductio ad absurdum*. Let us try it.

If consciousness be not a factor in the result of reaction of nerve-centres under the stimulus of sense-impression, then would this result, i. e., the conduct of animals be precisely the same if

there were no consciousness. This seems sufficiently incredible ; but more remains. If consciousness and self-consciousness be not a factor in human conduct, then history, or all the results of human activity, individual and social, would have been precisely the same as we now find it, even though there had never been any consciousness or self-consciousness at all. Society would have progressed, wars, revolutions, and parliamentary debates would have occurred ; telegraphs, telephones would have been invented ; railways and cotton-mills built ; masterpieces of poetry, painting, and music achieved ; science, art, philosophy, and religion would have arisen and blessed mankind. In fine, all details of work done and every word spoken or written would have been precisely the same, even though man was wholly unconscious of what was going on. Man's body and man's mind and human society, according to this view, may be compared to a complicated engine rushing along at a rapid rate without engineer, except necessity, or law, or what not. Consciousness is on the engine, true, but only as passenger. Although understanding clearly and sympathising deeply with every movement, though deeply affected with joy or grief, with hope or terror, wholly unable to modify the course of events. Everything happens by necessity, and would happen just the same even though consciousness were not present at all!! It seems to me impossible that any sane mind, unsophisticated with metaphysical subtleties and fully realising the logical consequences of this view, can for a moment maintain it.

And yet—and yet—most complicated and wonderful machinery in the animal and human body *does* work perfectly without consciousness. Complex, delicately adjusted, and appropriate purposive work *does* go on without conscious engineer. Here is the difficulty. How shall we explain it.

The animal body, as already said, is an instrument for action and reaction between the external and the internal world or nerve-centres. But there are *many degrees in the freedom of the reaction*. In the simplest and most automatic form, the steps of the process are briefly as follows : Action (*a*) sense-impression, (*b*) inward transmission, (*c*) change in a nerve-centre. Reaction (*d*) outward trans-

mission, (*e*) muscular contraction, (*f*) change in external phenomena. In the simplest case this is all. Thus, if the spinal cord, or the medulla, be the centre, action is followed by reaction with certainty and precision, and the most complex movements may be perfectly and yet unconsciously executed. The whole series is in the domain of physiology. But if the centre be the cerebrum, then at least two more links are added to the chain from the domain of psychology. The incoming current determines changes, not only in the brain, but also in consciousness as sensations, perceptions, etc.; and the outgoing current is started, not by brain-changes alone, but by will. Now, if the incoming current started by sense-impression is followed immediately, like the rebounding of a ball, by the outgoing current determining movement, without the intervention of consciousness and will, then we call the movement reflex. On the contrary, if changes in consciousness and will intervene and control the result, then we call the movement voluntary. The reflex system operates in all parts of the body and in all animals; the conscio-voluntary is superadded in some of the movements of the higher animals, and then takes control. In these, therefore, the reflex underlies and conditions the conscio-voluntary, while the latter stands above and dominates the former. If the conscio-voluntary be paralysed, or its activity be suspended by sleep or coma, then the reflex is far more distinctly and universally operative.

Thus, then, there are two primary and strongly contrasted groups of animal movements, viz., the reflex or automatic, and the voluntary. But the great gap between these is almost wholly filled by gradations from each side approaching the other. In the reflex group there are (*a*) the purely automatic movements, wholly withdrawn from consciousness as well as from will, such are the movements of the heart, stomach, intestines, etc.; (*b*) then come movements withdrawn from will, but not from consciousness, such as swallowing, coughing, sneezing, etc.; (*c*) movements attended with consciousness and partly controlled by the will, such as breathing, etc. So also, on the other hand, are there voluntary movements in various degrees approaching the reflex. (1) Movements which are entirely voluntary—*deliberate* movements requiring the whole atten-

tion, and, in some cases of complex movements, even painful attention. Such are nearly all movements made for the first time. (2) *Habitual* movements. These require only dim consciousness and a general superintendence of the will. They are withdrawn from the full undivided consciousness, and are therefore *semi-automatic*. Ordinarily they go on without full consciousness or direct action of the will; but if anything goes wrong, consciousness and will quickly intervene to rectify, and they again relapse into semi-automatism. Walking, flying, speaking, writing, playing on a musical instrument, come under this head. They at first came under the first head, but were made easy and semi-automatic by frequent repetition. They are, therefore, *acquired by individual experience*. (3) Instinctive movements. These are still more automatic. They are the result, not of individual experience, like the last, but of *ancestral experience*, inherited through many generations. They are, therefore, withdrawn from individual experience, but not wholly from consciousness and will. (4) Reflex movements. These are finally withdrawn from consciousness and will, but in various degrees, as already shown.

Now, all these kinds of movements exist in animals as well as in man, although the first, i. e., the deliberately voluntary, only to a limited extent, and then only in the first formation of habits and instincts. Nearly all the so-called voluntary acts of animals are either habitual or instinctive, and are determined by impulses and not by motives. But in man there is still a higher form of activity not yet mentioned, viz.: that in which consequences, especially moral consequences, are presented to the mind and weighed; in which impulses, solicitations, motives, are balanced one against another; in which all these are again made the objects of conscious thought, and we are distinctly conscious of the fact that we ourselves are umpire and responsible for the result. The determining factor in this case is will in a *higher and freer* sense than in any of the preceding. This is the *free-will* characteristic of man. No such weighing of motives (if motives there be at all in them, and not mere impulses), no such reflexion on motives as objects of thought ever occurs or can occur in animals. We call this *free-will*, not be-

cause it is absolutely free and unconditioned, but because it is *freer* than any lower form. As already said, there are many degrees of freedom of activity. Instinctive acts are free in relation to reflex; habitual acts in relation to instinctive, and deliberate acts of animals in relation to habitual. So also self-determined moral acts are free in relation to all other lower forms. There is a gradually increasing freedom of activity as we go up the animal scale. The increase between animals and man is a great one, great not so much in amount, as in the new possibilities introduced then and there. But absolute freedom belongs to God alone.

Finally, we have already shown in several departments a human plane and higher human plane; that there is a human life as distinguished from animal life, and a higher human life as distinguished from a lower. So it is here, also. There is a free-will distinguishing man from animals, and a *freer* will distinguishing a higher from a lower type of man. There is a free-will which is free only in the sense of being self-determined and therefore morally responsible, but is nevertheless unwillingly restrained by, and chafes against the bounds set about it by the all-embracing will of God, which is the law of perfect righteousness—and there is a freer will, freer because no longer restrained by external law; because the law of righteousness is freely accepted as the law of its activity; because it moves freely in loving accord with the absolute will.

Out of these two last, viz.: *self-consciousness* and *free-will*, grow the moral and religious nature of man. These, therefore, must be characteristic of man. In fact, they are the most obvious of all characteristics. We do not count them among the primary characteristics, only because they so obviously flow from the simpler elements given above.

Now, of the seven characteristics enumerated above, which, if any, is most fundamental and essential—which, if any, precedes and determines all the others? Some have said *speech* is the most fundamental and preceded all others, even thought. Yes, surely *animal* speech did so precede—but is it not evident that at least some dim perception of relations as relations, or what I have called the power of words in relation to one another, must have preceded words

expressing such relations, and therefore rational speech. Shall we say, then, that *thought*, or the perception of relations as relations, is the fundamental characteristic which we seek, and it therefore preceded speech? This seems, indeed, in some sense true: for a practical awareness of relations certainly precedes speech of any kind, much more, rational speech. But on the other hand, it is quite evident that words as the *sensible and transmissible* embodiment of the beginnings of thought are absolutely necessary for their growth into clearness—in fact, for the growth of *practical awareness* of relations into the clear perception of relations as relations abstracted from the things related. It seems to me that these two must always have acted and reacted on one another, and, therefore, must have developed together *pari passu*. As practical awareness of relations gradually developed into abstract ideas, so *pari passu* animal sounds gradually developed into animal speech, and animal speech into rational speech. All the other characteristics are similarly inter-related.

Or perhaps we may make one exception—perhaps there is one to which all others are contributory, and which, therefore, is last to arise—viz., *self-consciousness*. The abstraction of *self* from the facts of consciousness is the highest and most complex of all abstractions and may be regarded as the consummation of humanity. All the others may be likened to the labor-throes—this is the actual *birth*. All the others are like the breaking of day and the increasing twilight; this is the rising of the sun above the horizon of humanity. The discovery of self is the discovery of the world of *reality* underlying the world of phenomena. With that discovery man rises at one step into an entirely different plane of life.

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THE DUALISTIC CONCEPTION OF NATURE.

IN one form or another, monism is a necessary concept of science. For scientific research is essentially the effort of human intelligence to bring all facts into intelligible connexion with one another; and that object can be attained only when all facts are comprehended as parts of *one* intelligible system. The unity of nature therefore is implicitly assumed at the very dawn of scientific intelligence, and it becomes an explicit concept as the work of science gains in perspicuity. Accordingly, on first reflexion it must appear somewhat startling, that this monistic assumption of science should, from a very early period, have been traversed by an illusion of dualism; and in the interests of science itself, not to speak of the general interests of humanity, it becomes important to trace this illusion to its source, and to point out the injurious influence it has exerted upon human life in practical as well as in speculative activity.

The conception itself of nature involves the conception of its unity. The term *natura* expresses admirably, because literally, that eternal process of birth, to which it has come to be applied. By its grammatical structure in fact it conveys the idea more pointedly than *φύσις*, which it was used by the Romans to translate. Of neither word does there appear to be a philological history of any value for the history of scientific ideas. The use of *φύσις* goes as far back as the Homeric poems. In *Od.* x. 303, the word is used to denote the "nature" of the mythical herb *moly*, which Hermes gives to Odysseus as a counter-charm against the spells of Kirkê. The force of the word here is indicated by the fact, that a few lines before (vs. 288) the word *κράτος* is used as an equivalent to denote the "power" of the herb.

In this use of *φύσις* there is already implied the idea of some quality in a thing that makes it what it is, and cannot therefore be altered without the thing ceasing to be. In other words, the *nature* of things is conceived to be determined by the very power which makes them what they are, and thus to be independent of human will. Accordingly those phenomena, which are products of nature, come to be contrasted as unalterable with those which, being products of man, can be altered or abolished at any time by his efforts. This contrast had already become a familiar commonplace to the Athenians in the second half of the fifth century B. C., as a result of the primitive philosophical movements of the preceding century. In the speculations of Sophist and Socratic alike the antithesis is quite marked between *φύσις* on the one hand, and *νόμος* or *δέσις* or *τέχνη* on the other. In fact the great problem of that period was to find out whether the principles of man's moral life are based upon distinctions in nature, or are merely regulations of human enactment, institutions of human society, artifices of human ingenuity.

But along with this idea of nature being unalterable there runs the idea of its unity. The one fact indeed is made the corollary of the other. The essential nature of things is conceived to be unchangeable just because all their phenomenal changes are supposed to be temporary modifications of some principle which remains for ever the same. To find this principle was, from the outset, the problem of all scientific inquiry. In the language of early Ionic thought this principle came to be spoken of as *ἀρχή*, at least from the time of Anaximander who is said to have first used the term in its philosophical signification.

Among the Ionics monism was thus implicitly assumed. But it became an explicit feature of speculative thought among the Pythagoreans, who may thus be regarded as the first true monists. The monad indeed became with them *the ἀρχή* of all things, and that in a far more rigid sense than with Leibnitz. For the Pythagorean monad is really nothing but the abstract idea of unity,—the abstract unity whose repetition constitutes all number, and constitutes thus also the very essence of all things.

But the Pythagoreans evidently felt the perplexity of the problem which this rigid monism imposed upon human thought. "How can the whole of things be for us a unity, and yet each separate?" *Πῶς δέ μοι ἔν τι τὰ πάντα ἔσται, καὶ χωρὶς ἑκάστου*; is a question which the Orphic poems, though spurious, yet with a certain historic truth, represent as being forced upon human intelligence at the very dawn of reflective thought. In the effort to solve this problem the monism of the Pythagoreans collapsed into a fateful phase of dualism. Among numbers they detected two forms, even and odd; and recognising number as the essential constituent of all things, they were forced to find the same duality throughout the universe. With a curious, at times even pathetic, illustration of the limitations of human intelligence, they followed this dualistic idea into fantastic analogies of odd and even with male and female, right and left, good and evil, etc.,—mere conceits which have long ago lost all meaning and interest. But it is only fair to this old school of thinkers to bear in mind the incalculable service which they rendered to primitive science by their essentially monistic conception of nature. It was they who laid the first foundations of exact science by their efforts, fanciful though they were at times, to trace throughout the universe proportions calculable in definite numbers. They also, alone among ancient thinkers, rose above the sensible appearance of stellar movements, and conceived the earth as merely one of the planets revolving round a central point. It was in fact a fragment of the Pythagorean Philolaos, that suggested to Copernicus the heliocentric explanation of celestial phenomena. It remains, in fine, a significant fact, that the word *κόσμος*—the general Greek term for any orderly arrangement—was first applied by the Pythagoreans in the use which almost displaced its primitive meaning, to denote the universe of things *διὰ τῆς ἐν αὐτῷ τάξεως*.¹

Dualism therefore is, at worst, merely an unessential feature of the Pythagorean philosophy, and its influence is practically neutralised by the intrinsic monism of the system. But this is not the case, or at least by no means so completely, in the Eleatic philoso-

¹ Plutarch, *De Plac. Phil.*, II., I.

phy. Here appears, for the first time, in rugged prominence, the most obtrusive dualism of popular thought and of science. The first discovery of common reflexion, as well as of scientific inquiry, is the fact, that "things *are* not what they *seem*." It is therefore one of the earliest results of reflective thought, to distinguish things as they really are from things as they appear to the senses. As the real nature of things is revealed by reason forcing us to go beyond their sensible appearance, the former comes to be distinguished as *that which is thought by reason* (νοούμενον) from *that which appears* (φαινόμενον). This antithesis is the most prominent feature of Eleatic thought. But the explanation of the antithesis remains a problem unsolved by the Eleatics. It is a knot which they cut rather than untie. They fancied the problem solved by the simple explanation, that that which is demonstrated by reason—the noumenon—is the sole reality (το ὄν), while the sensible phenomenon is a non-entity (τὸ μὴ ὄν). But this is no solution of the problem. Sensible appearances *are* sensible appearances. They *exist* as such. Reason is therefore called to explain their existence, even if it be merely as sensible illusions. But reason cannot be satisfied with any explanation that is not based on a reasonable principle, that is, a principle in harmony with itself. Phenomena, therefore, and noumena, are to be explained on the same principle, and the Eleatic dualism vanishes in an inevitable monism.

Perhaps the first to see this clearly was Anaxagoras, and it is this fact that makes Aristotle speak of him as if he had uttered the first sensible word of a sober mind¹ on the problem of philosophy. Anaxagoras saw that every principle offered by earlier thinkers as explaining the essence of all things,—water, air, fire, earth, number, or whatever else it might be,—always implies something more primordial. For every such theory always appeals to reason in vindication of itself. The true principle, therefore, Anaxagoras held, must be reason. This is the ultimate explanation of all things. Accordingly, from this time forward it became impossible to leave

¹ Οἷον νήφων ἐφάνη is his striking phrase (*Metaph.* I., 3).

reason out in any attempt to give a reasonable account of the cosmos.

But naturally for man it is of prime interest to vindicate a rational unity in his own life rather than merely in the external world. In this direction no service has been rendered greater than that of the Stoics. No school has ever grasped more clearly the conception of all nature and all life as created and controlled by Perfect Reason. In fact the conception of nature (*φύσις*) was itself elevated and expanded. Prior to the Stoics the term had been mainly used, as it is perhaps mainly used still, in reference to the external material world. It was the Stoics who seem to have first applied the term to the phenomena of man's internal life; so that his moral nature and the nature of the external world came to be represented as governed by the same laws, and these the laws of Perfect Reason. Natural law, therefore,—the law of nature,—was no longer conceived as merely the mode of operation in the physical world. Henceforth it came to be thought of rather as that unalterable principle of consummate reason which finds its highest expression in the laws of man's moral life, and its lower expressions in the laws of the physical world.¹

But in spite of this apparently all-absorbing rational monism an unfortunate dualism crops out in the Stoical system. It is the old dualism of sense and reason, which had been the prominent feature of Eleatic philosophy. No longer, however, does it signalise an antithesis in our views of nature in general; it is specially centred upon an antagonism in man's moral life, which is declared to be irreconcilable. Following Plato and Aristotle, the Stoics divided off the sensibility with its passions as a function of the soul's life totally distinct from, and even opposed to, reason. Passion, for the Stoic, became explicitly what it was implicitly for Plato and Aristotle, an embodiment of the abstract essence of irrationality—

¹ Perhaps the most interesting development of the Stoical doctrine of the law of nature was in Roman jurisprudence. The later jurists of Rome, who were generally Stoics in speculation, fancied that the law of nature was to be found in their own *Jus Gentium*. The conjecture was quite unhistorical; but the Stoical theory of an ideal law of nature, which all human legislation ought to follow, exerted a beneficent influence on the jurisprudence of the empire.

τὸ ἄλογον. It is thus the moral enemy of those activities of reason which form the essence of rationality—τὸ λογιστικόν; and rationality, as we have seen, is, for the Stoic, the very essence of nature, the governing principle of all things. In its practical applications, therefore, the Stoical ethics would make no terms with passion; all kinds of sensibility must simply be suppressed. For the excellence—the virtue (ἀρετή)—of man is to be found only in a life that is in accordance with nature; and as reason is the essence of nature, a life in accordance with nature must be a life in accordance with reason. But a life that is to any extent controlled by sensibility, however gentle and amiable the sensibility may be, is to that extent irrational; and, therefore, the ideal of human excellence is a state of apathy in which life is completely controlled by passionless reason. As a result of this, Stoicism drew a painfully dualistic division between men, in its estimate of their actual characters. All men, in this estimate, must be either rational or irrational. That obvious intermingling of virtues and vices in actual life, which must be recognised in all just estimate of human character, was stubbornly ignored by the Stoic. For him that man is completely sunk in vice who indulges his passions to the slightest degree, just as—to use a common illustration—the man whose head is one foot under water is drowned as completely as the man who is covered by a thousand fathoms. No doctrine of the narrowest sectarianism in the Christian Church ever drew a harsher division between converted and unconverted.

The dualism of Stoical ethics has thus suggested the dualism which has corrupted Christianity. The indebtedness of Christian theology and ethics to the theology and ethics of Stoicism is a commonplace of intellectual history. The whole conception of the universe, as developed in the Christian doctrines of creation and providence, drew largely from the writings of the Stoics. This conception, which represents the universe as being in every nook and cranny under the ceaseless operation of Supreme Intelligence, might be supposed to exclude the very possibility of any irremovable dualism. Yet a painfully prominent dualism distorts the characteristic features of the Christian conception of the universe. It is in some

respects based on the old moral antagonism of sense and reason, in New Testament language, of the flesh and the spirit. The very excellence of Christian ethics tended to accentuate this antagonism. For by holding forth a peculiarly noble ideal of life as the fruit of the spirit, Christianity degraded into a more violent contrast the shortcomings of man's actual conduct, to which the flesh drags him down.¹ This deeper consciousness of sin, evoked by a higher conception of righteousness, has undoubtedly given a sharper antithesis to the ideas of God and Devil, of angel and demon, of heaven and hell, which make up a large portion of distinctively Christian thought. The grotesque imagery of horror which has been evolved out of this dread dualism, is indeed one of the most repulsive regions in the popular mythology of Christendom, yet it is not without a certain terrible fascination which has attracted the poets of Christendom to it as offering a fit material for the highest tragic art.

The source of a great deal of this imagery is still a problem for historical research. In the history of the subject prominence has not unnaturally been given to Manichæism. But the connexion of this system with Christianity has often been misunderstood. Manichæism is not properly a Christian heresy; that is to say, it did not spring out of the circle of Christian thought. It is not even to be regarded as a phase of Parseeism; for the Parsee creed is not, any more than the Christian, dualistic in its true interpretation. Manichæism indeed draws certain ideas from the Parsee creed as well as from the Christian; but in its essential drift it is independent of both. Recent researches seem to prove that Manichæism grew out of an old Babylonian religion modified by some elements of Parsee and of Christian thought, possibly of Buddhist as well.²

¹ It is worth noting also, that the extreme chiliasm of apocalyptic literature often pictures the present condition of the world as irredeemably irrational, to show in more brilliant relief the splendor of the expected millennium.

² See Kessler's *Untersuchungen zur Genesis des manichäischen Religionssystems* (1876), and his article in the *Real-Encyklopädie für protestantische Theologie und Kirche* (2d ed.). The older work of F. C. Baur, *Das manichäische Religionssystem* (1831), gives prominence to the influence of Buddhism.

Though Manichæism is thus to be considered as a religion outside of Christendom, it probably contributed, with the general Semitic influences which it represented, to accentuate the dualistic ideas of Christian demonology. The Devil of Christendom, though created by God, is still conceived as His successful enemy, marring the perfection of His work by a factor of evil which is maintained in existence, not only throughout the whole history of earth, but for ever afterwards in hell—irremovable by all the power of divine wisdom and love.

This influence of Manichæism upon Christianity seems to be implied in the prominence which it receives in the writings of Augustine, the man who did more than all the early thinkers of Christendom to shape the theological system of the Christian Church. It was in fact rather in Latin than in Greek theology that Christian thought tended to the dualistic conception of the antagonism between good and evil. Under the influence of the juridical ideas predominant in the Latin mind, the universe came to be conceived often after the analogy of the Roman Empire, and the Supreme Being mainly, if not exclusively, as an infinite monarch, whose laws must be vindicated at any cost. To minds dominated by such a conception of God it seems a sufficient vindication of divine law to inflict an infinite penalty on its violation,—a sufficient triumph of goodness if the will to evil is balked by banishment into some dim chaos of eternal suffering, beyond the confines of the divine cosmos. Such representations were extremely natural for minds to whom the problem of human life was mainly such jural organisation of society as it was the mission of the Roman people to work out. These representations are also, of course, useful in their place for popular illustration. But the concept of God, which they imply, is a very inadequate category on which to construct a philosophical theology. The finer speculative genius of the Greek Fathers was untrammelled by the peculiar concepts of Roman jurisprudence; and therefore it is not surprising that Origen, the most brilliant of them all, shrank from an eschatology which did not ultimately eliminate hell, finding the true triumph of good only when all will to evil is finally subdued.

But the theology of Augustine, with all its dualism, became that of Western Christendom, and has continued to influence Western thought, both in and out of the Church, even to our day. His dualistic influence, like that of the Stoics, has been very marked in the separation of man's moral life into two mutually exclusive conditions or spheres. The state of nature and the state of grace are two concepts, the antithesis of which has been peculiarly distinct in all theological speculation moulded by Augustinian influences. The early history even of modern philosophy can scarcely be understood if we fail to note the fact that the Augustinian definition of these antithetical concepts formed a prominent subject of controversy about the dawn of modern speculation. In the Catholic Church Jansenism was substantially a revival of Augustinianism; and though the Jansenist doctrines were condemned by a papal bull enforced for political purposes by Louis XIV., yet they formed the creed of the finest minds in the Church of France. They were specially associated with the eminent men who lent the lustre of their learning and literary power, as well as of their piety, to the Oratory and Port Royal during the seventeenth century, and it is a fact of some import in the history of philosophy, that it was among these men that Descartes found his most enthusiastic disciples and his most brilliant expositors. In the Protestant section of Western Christendom, too, the essential drift of Augustinian teaching was revived in Calvinism; and Calvinism became the predominant phase of religious thought among the most distinctive representatives of the Protestant movement. It drew out all the passion of intellectual as well as of religious life among the Huguenots of France, among the Anti-Remonstrants of Holland, among the Puritans of England, Old and New.

But here, as often elsewhere in the history of human thought, extremes meet. For, while Jansenism and Calvinism represented the most intensely religious movements of human thought in the seventeenth century, on the other hand, in that century at least, probably speculation never took a more blankly anti-religious direction than in the philosophy of Hobbes. That philosophy is an attempt to construe all the phenomena of the universe, including the

phenomena of man's life, by eliminating all the essential ideas, not of religion only, but even of morality, and reducing nature to a play of purposeless, non-moral agencies. Hobbes's conception, therefore, of the state of nature in human life is fundamentally that of Calvinist and Augustinian. His cool, callous exposition of this concept—his description of man's natural state as a *bellum omnium contra omnes*, caused by all men being naturally actuated by egoistic impulses alone—all this is not only paralleled, but even exceeded, in its repulsiveness by the language of eminent Calvinistic divines.

A similar meeting of extremes is found in the comparison of Calvinism with another system of philosophy, which was almost as great a horror to orthodox thought as the system of Hobbes. The system of Spinoza seems indeed in many ways a complete contrast to that of the English philosopher. Yet beneath the apparent antithesis of the two systems there is a profound affinity. Though Spinoza starts with the idea of God, which is an adventitious adjunct to the system of Hobbes, yet his definition of the idea, reducing it to that of mere substance or being,¹ scarcely carries us beyond the agnostic concept of the Supreme Being, which is all that Hobbes allows. Moreover, Spinoza's identification of will and intelligence in God simply means that all we understand by intelligent activity disappears in mere will. The volition of God is therefore explicitly denied to be an act of purposive intelligence. Creation is a purposeless evolution of the eternal substance, a necessary modification of its attributes in accordance with its own irresistible laws. Under such a concept of creation there is no room left for independent activity or personal responsibility on the part of the finite individual. Consequently all the ideas of moral life are relegated by Spinoza among the illusions of "imaginatio," that is, the intellectual activity from which all error arises, and which is therefore carefully distinguished from the genuine knowledge to be attained only by *ratio* and by *scientia intuitiva*. As a result, Spinoza explicitly coincides with Hobbes in his conception of man's natural state. In this

¹ "Ens absolute infinitum, hoc est, *substantiam*, etc." Spinoza's *Ethics*, Part I., Def. 6.

state man is declared to be void of those ethical *imaginationes* which grow only out of the soil of civil life.

The conception of nature by Hobbes and Spinoza was in a way thoroughly monistic; but it attained this character only by confining the term to the lowest class of phenomena, and ignoring the phenomena of intelligent moral activity as artificial conventions of society. It requires no very subtle argument to show that, under this analysis, the obligations of social union themselves disappear. For if there is no obligation *a priori*—no obligation *in the very nature of things*—to observe a contract, then the so-called social contract itself is left without the support of any such obligation, and it simply remains a question whether the individual cannot outwit by superior astuteness, or resist by superior power, any governmental machinery that may be devised to enforce the contract. A similar issue is inevitable under Hobbes's analysis of religion. If the very nature of things, as unfolded by science, does not involve the essential ideas of religious life, then it is impossible to create a religion by artificial enactments of any civil authority. This fact is overlooked by Hobbes and by Comte as completely as by the agnostic champions of ultramontaniam in the Church of Rome. It is not therefore surprising that Hobbes's philosophy of religion and morals should have met with strong opposition from men who were in earnest about the obligations of moral and religious life. Their opposition commonly took the form of a return to the larger and nobler conception of nature which had distinguished the ancient Stoics. A long line of writers, especially among the moralists of England, sought to trace, either in the nature of man or in external nature, if not in both, the foundations of his moral and religious life. Again the old Stoical conception of the law of nature became familiar in ethics and jurisprudence, and all positive enactments of human societies were viewed as merely imperfect embodiments of the law of nature. Accordingly men became accustomed to conceive the problems of moral and social activity as implying an endeavor to break through the artificial trammels by which civil society was cramping the life of man, and to get back to the simple requirements of nature, of natural law.

It is not difficult, and it is profoundly interesting, to see how this conception of life's problems represented the drift of the great historical movements by which last century was characterised. The claim of individual freedom against unreasonable restrictions of social law had become inevitable, partly under the trend of speculative thought, partly under the impulse of social conditions themselves. For never perhaps in the history of civilisation had human life entangled itself in such a complicated net-work of exacting regulations. Every sphere of man's activity from the highest to the lowest,—religion and literature, morality and etiquette, military and political and industrial life,—all were subjected to minute and often petty and even vexatious restrictions that prevented the natural and reasonable expansion of the human spirit which it was their proper function to develop. Never had the clothing of custom, in which of course human life must always invest itself, become so worn-out, so ill-adapted to the wants of growing humanity. The great revolution, which shattered the old life of Europe as the century closed, was an outburst of passionate impatience on the part of European society to get rid of its worn-out clothing before it had well considered in what fashion it was to be clothed anew.

This memorable movement is commonly regarded by historians as having found its most characteristic literary expositor in the writings of Rousseau. There we find the reactions against the social philosophy of Hobbes and Spinoza carried to its extreme. The contrast, which these philosophers had drawn between man's natural state and his civil state, is by Rousseau completely reversed. The state of nature he conceives to be one of innocent social equality, which has simply been corrupted by the artifices and restrictions and divisions which political institutions have introduced.

But the extravagance of this theory as well as of its opposite arises from the fact, that the state of nature, as defined by both, is a pure fiction of abstract thought. It is an attempt to conceive what man would be if we were to eliminate all those factors of his life which are derived from social organisation. It does not matter that in one case these factors are supposed to be the virtues by which human life is adorned, in the other the vices by which it is

corrupted. In either case the error is the same. It consists in taking a fictitious abstraction for a reality in nature. It ignores the only human reality that nature knows, that is, man living in the social state. The absolute solitary is not a natural man. As Aristotle said long ago, he is either a god or a brute.

It is evident then that all dualistic separations of man's life into spheres that are mutually exclusive originate in an imperfect conception of nature in general, but of man's nature in particular. This imperfection continues to mislead scientific inquiry. Human nature is still at times defined by concepts which imply a merely animal existence; and an attempt is made to interpret human actions simply as effects naturally resulting from impulses of pleasure or repulsions of pain. On such an interpretation of human life science must of course pronounce all morality of a spiritual or disinterested nature to be not only impossible as a matter of fact, but even incapable of any rational vindication. In like manner if nature in general is defined by similar narrow concepts, if nature is understood to mean the universe with all the rational purposes of human life eliminated, then it may be perfectly consistent to assert that there is no morality in nature, or even that nature is profoundly immoral. But the evolution of the universe with the history of man eliminated is the drama of Hamlet with the part of Hamlet left out. It is the life of man that at once forms the most essential part of the problem of all science, and furnishes the most essential data for its solution. The truth is, therefore, that scarcely one eminent thinker has fallen into this narrow conception of nature without at the same time protesting more or less explicitly against its inadequacy to satisfy the demands of scientific thought. More than one noble passage might be cited from recent literature, in which the scientific thinker rises to the part of a modern Prometheus, defying the non-moral omnipotence that he seems to see ruling in external nature, and asserting the power of man's internal nature to act upon a moral law of love in spite of any suffering which the non-moral laws of external nature may bring about as the result of his action. Nor is such Promethean assertion an abandonment of the scientific attitude of thought for an idle bravado of fancy. It is rather a rec-

ognition of the fact that there has always been in the universe a power adequate to sustain the man

“Who trusted God was love indeed,
And love creation's final law,
Though nature, red in tooth and claw .
With ravin, shrieked against his creed.”

Science therefore must give to the reality of this power a prominence equal to the reality claimed for the force of non-moral causation, and it can escape from an incomprehensible dualism only by advancing to a conception of nature, which embraces both in intelligible harmony.

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NATURE AND THE INDIVIDUAL MIND.¹

I. OBJECTIVE AND SUBJECTIVE.

MY body is a part of nature. My individual consciousness—on this point there can be no doubt—is absolutely dependent on the structure and development of my body, on my organisation, and consequently also on nature. Is, therefore, my ego, am I myself, only a part of nature? Or, to put it differently, how does my ego differ from nature? It will be said, by consciousness. I discover in myself mental representations, volitional impulses, and feelings; but in nature I meet with bodies and motions in space. We are simply confronted here with the old question, How can physical things be converted into psychical states? The change from one species of existence into another altogether different from it is absolutely incomprehensible. We must inquire, therefore, whether any such fundamental distinction really exists between the spatial object and its mental representation. Possibly the problems involved in the relation of nature and the individual mind will find in such an inquiry their own solution.

The moon moves about the earth, it exists. *I*,—my individual mind,—am not a condition of its movement and existence. The moon takes no account of my individual ego. This moon is called an *objective part* of nature, a body in space; and such it really is. I now look at the moon and see it. In this act both the moon and myself are necessary—a definite collocation in time and space of the moon and myself. The moon which I see is called in reference to myself a *perception*. Thirdly, and lastly, the moon is invisible.

¹Translated from Professor Lasswitz's manuscript by Thomas J. McCormack.

I simply think of it. Here I alone am necessary and the moon not, at least not at the same time. This moon is called a *representation*. The last two moons are called *subjective* phenomena, because I am necessary to their production. In what respect, now, do these three moons differ from one another?

No one need see the first moon. The second, many may see together. The third, I alone see.

What is meant is this. The objective moon produces effects, or, generally speaking, is the subject of relations over which I have not the slightest control. The perceived moon cannot produce such effects, unless I tacitly introduce the objective moon in some way or other and consider more than its mere relation to myself. It is true, the existence of this subjective phenomenon is not entirely dependent on me, for the moon must be within my range of vision, but its existence is nevertheless largely co-dependent on me. The represented moon, if I disregard the fact that I must at some time or other have perceived the moon, is entirely dependent on the states which I comprehend under the name of my ego.

What are the real facts here? Does the common theory hold, that the objective moon becomes my perception or representation by having a copy or symbol of its actual existence imported into me and by its having its physical reality transformed there into psychical reality—into my mental representation? Are representations a new species of existence as distinguished from real existence? Is this the reason that the represented moon has not the same obtrusive characters of existence that the real one has? If this were the case the spatial bodily world, or nature, would undergo in the mind of man a transformation into something unspatial, the spiritual or mental. As representations, things would take on a different mode of existence. The physical would be convertible into the psychical.

In opposition to this theory I shall attempt to show that no such transformation takes place. Objective things are distinguished from their subjective representations, not by their ceasing to be corporeal, and taking on another, spiritual, form of existence. On the contrary, in both cases we are concerned with definite relations of the same kind. What takes place is this. The determined combi

nations of elements which represent things in space are altered by the reception of new elements and lose thus their distinctive character, whilst simultaneously a change also takes place in that special combination of elements called the ego. Objective and subjective are distinguished solely by their different existential contents. If our perceptions and representations appear to be altogether different, and, as they really are, more evanescent and indeterminate, as compared with objective things, the reason is that the *content* which is severally compacted and unified in them is different. The factor which alters the objective determinateness of things is combination with the countless and varying modifications which are introduced from all parts of the world into the nervous system and brain of man, and this change by the participation of the elements called the ego is our sole object of reference when we speak of representation as opposed to thing. But the *law*, or rather the conformity to law, by virtue of which the unity of things and the unity of representations originates, is the same; the two are formed at the same time, but embody only in part the same content.

After this brief provisional statement of our theory, we may enter at once into the consideration of details.

That bright, round thing which exists as the moon in the heavens, and that bright, round thing which we perceive as the moon, are one and the same. If I call the first *objective*, I do so because it is connected by law with astronomically determinable movements of the earth and the sun, and hence is known as a spherical body of this or that magnitude and composition; and in calling the second *subjective* I do so because of its connexion by law with certain physiologically determinable changes of my nervous system which I am conscious of as sensations and feelings. True, reference to nervous systems, under conditions of law, is also necessarily implied in the aforementioned objective combination, but only to the extent of its being determinable by law as a like effect on many nervous systems. If I wish to single out this latter relation, I call the moon an objective heavenly body; but if I wish to emphasise that I am considering especially a modification of *my* nervous system, together with the system of the moon, I speak of my subjec-

tive representation. The difference is not that we are concerned in the one case with sensations and in the other not ; for we cannot define the objective moon without sensations. Both are real in respect of being systems, determined by law, of qualities and quantities in space ; the objective moon consisting of such as are mathematically determinable a long time ahead, whilst the subjective moon involves in addition relations that depend on the individual constitution of single men, and hence can never be fully assigned. Consequently the subjective is something that is always more or less indeterminable, something that always partakes of the individual, and on this ground solely it appears as a different kind of existence—the psychical or spiritual.

The first objection we shall encounter will be to this effect. That moon, which hangs there in the heavens 360,000 kilometres from the earth, and my representation of that moon, are two different things ; the one is outside in space, the other is inside in my mind.

This last we deny. They are different, it is true, yet not by their mode of spatial existence, but by the character of the elements involved. Has any one ever pictured to himself the moon otherwise than in space? The represented moon, therefore, is as much in space as the objective moon, and that which distinguishes the latter from the former is not a different kind of existence, but simply a different combination of the constituent parts of the same existence in consequence of which the one is designated objective and the other subjective. And if the objection be made : “I do not extend to the moon, how, then, can the represented moon be inside me?” I answer, if the word *I* is to mean only my body, as that is marked off in space by my skin, then I do not extend to the moon, and it is on this account that the moon is said to be “outside.” But if the word *I* signifies everything that makes up the present contents of my existence, the rich total of relations by which a part of the world is so joined with me that I have experience of it, then the moon belongs just as much to me as my body does. And everything we assign to our ego in this manner, we call our representation, in order to distinguish it from that which under other condi-

tions exists without our ego. But a difference other than a difference of the mingled contents is not present.

The moon and the earth, the path of the luminous rays, and everything else that is necessary for my seeing the moon—all these elements form, together with my body, a system of law-determined relations. Exactly the same elements also form a system of relations with the body of some other man, say my neighbor, and the only difference in the two cases is, that in place of my body that of my neighbor has been substituted, and thus a few of the relations have been changed. And thus these elements, moon, earth, light, etc., form with every human body new and different systems, which contain all the first-mentioned elements under such modifications only as are required by the different human bodies distributed in space, with their various individual differences. The element "moon," which is common to all these systems remains in all these modifications the same moon, and in so far as it is determinately related to the earth, light, etc., independently of the bodies of men, it is the objective moon above in the heavens. On the other hand, in so far as it appears in any of its myriad relations to single human bodies it is the perceived moon, or, when certain other relations, given in the conditions of individual men, are added, it is simply the represented moon. When this last is the case, all determinative data are missing by which the moon's astronomical position in space for the moment is determined, phases of illumination, etc.; its constitution is almost wholly determined by states of my ego, and only a part of the elements that constitute the objective moon are present. These are not sufficient for inducing that distinctness which the object itself possesses, but they have undergone no essential alteration. Care only must be taken that the difference between objective and subjective is not found in a different species of existence, physical and mental, etc. For it is precisely the problem set us to clear up this difference between object and representation.

Our view, then, is as follows: There are not finished, perfect things of which more or less accurate copies are produced in similar finished individual minds, but there are simply law-determined

systems of relations, to which our bodies also belong. These systems are objects and at the same time they are subjects. Objective existence and subjective representation are not two different kinds of existence, but are different simply with respect to the contents of the elements associated in them. That is objective which recurs as the same content in all combinations; that same content is subjective when those relations are added that arise from connexion with the human organism. As I myself am such an organism, no combination can exist for me in which my body does not participate. The reality in which this combination is given is called *consciousness*. As this reality and the existence of our bodies are inseparable, we call ourselves conscious beings and are prone to regard this consciousness as a special kind of existence, which was originally created in us by the action of things, which in contrast to ourselves we regard as another form of existence.

But as a matter of fact, consciousness is the only form of existence we know of. The sum-total of what constitutes the existence of an object is the relations of its properties to one another, and to other things; hence this existence is of the same kind with that which we specially designate the contents of our individual consciousness. For my ego, too, consists entirely of relations between colors, sounds, magnitudes, shapes, tendencies, etc., called my representations. Without such contents the ego regarded as individual mind is impossible. The distinction between mind and body is a distinction *within* consciousness. If we call the moon a body which is defined by its position, size, weight, and motion, and which existed long before men or human consciousness existed, then, of course, the moon is declared to exist as an independent regular system, quite independently of the existence of man. But the determinative data of space, time, size, weight, etc., which represent the thing moon, are exactly the same as the data which we find now in consciousness, since men and astronomers exist. The form of consciousness we can neither take from them nor give to them. It follows, therefore, that these laws which now we have discovered to be laws of *human* consciousness, are naught else than the *universal* laws under which the development of nature proceeds

and ever has proceeded, and under which we human beings, too, have been developed. In other words, the laws under which alone nature can be represented and our own present existence in nature understood, may just as well be termed laws of nature as laws of consciousness. The two are identical.

During this process of development of consciousness, now, a separation is effected of the contents known to us as our experience. One portion proves to be largely independent of the portion which we call our body, and its occurrences are mainly recognised as conformable to law; hence its appellation *objective*. The other part, whose contents are largely modifications of our own body, cannot, in like manner, be shown to be conformable to law, except with the help of the objective; its chief distinctive feature is that the changes falling under this head are connected with feelings of pleasure and pain. For this reason the ego appears to be a unit *sui generis* as compared with the rest of contents, and hence this part of the contents of consciousness is called subjective.

The two parts, however, are not necessarily distinct; they are not given *previously* to knowledge but are originally made separable *by* knowledge. To the savage, nature is not absolutely objective and conformable to law, but is an undetermined province of experience like any other. Even the phenomena on which he habitually relies can be interrupted any moment by sorcery. Nature, as it is objectively characterised by modern science, first originated with civilisation. For example, the moon originally appears in connexion with our body as a system wherein, in the earliest stage of civilisation, the moon was not singled out as something objective. The systems "moon" and "body" were separated only after much experience—after we had discovered that we could not control the moon as we controlled our hand. Advancing knowledge constructs from the regular motions of the moon a system which is clearly distinguishable from its connexions with our individual experiences. And the development of astronomy ultimately defined in mathematical equations and measurable properties and quantities the moon as an objective heavenly body. But even this separation

is incomplete, and increases with every augmentation of our knowledge of the moon.

Knowledge, therefore, is that process, rigorously conformable to law, in which on the one hand the contents of the world take definite shape as objective occurrences of nature, and on the other as experience of the laws of the same. There remains the still unknown part of the world-content as a problem which is constantly new, as the still undetermined source of all immediate subjective experience in conscious individuals.

II. PHYSICAL AND PSYCHICAL.

A large part of the difficulties which the relation of the objective and subjective offers, rests on a conception of the nature of knowledge which may be briefly termed the dogmatic. In this conception nature is regarded as a finished and independent product, as a fixed external power. Eternally inherent in the foundations of things, this power, or unalterable complex of relations of bodies in space and time, is then contrasted with the human mind as an extraneous alien element. It has its own laws, its iron necessity of action, and to complete the contrast the human mind also is regarded as an independent power. The problem of the human mind then is to convey this rigid alien power into consciousness and to accommodate itself to it or to overcome it; the assumption being that nature, during this operation, remains without, whilst only copies or symbols, so to speak, of her existence enter consciousness. Knowledge, thus, appears as the process of transforming nature into consciousness, and knowledge of nature as a sort of repetition of nature in our mind. Laws, concepts, perceptions, are not themselves nature but merely symbolical representations of nature. The world-picture which science sketches may therefore be quite differently constituted from nature; it differs from the latter less by its imperfections than by its form, as a map differs from the real country which it represents. Man cannot transport nature into his mind, no more than he can bring a country into his room; but instead of so doing, he constructs a map, and if the map be correct he can safely act upon its information. The principle of this dogmatic

view, accordingly, is that it presupposes nature as a finished product which existed previously to knowledge and without knowledge, and that it is the task of knowledge to master it. Of course on such a supposition mind also must be regarded as a similar power independent of nature and knowledge, and it remains forever intelligible how things in space, or even trustworthy symbols of things in space, can get into the mind. This dogmatic view, according to which nature essentially exists in a finished state previous to knowledge, may assume the form of materialism or spiritualism, of monistic Spinozism or hylozoism.

As opposed to this, the critical view of nature teaches that the opposition of nature and mind, object and subject, is originally produced in and by knowledge. Knowledge in the critical philosophy is not a subjective process which takes place only in the consciousness of the individual man, but it is the necessary foundation of whatever is common to all individuals, that is the condition of all actual shaping of experience; *it* is the real process in which the development of nature and the development of the subjective mind alike are accomplished. The same laws control the mutual action of bodies in space as control our necessary representation and rational conception of them. Things are not carried into our minds from outside, producing in us copies of nature, nor do we project subjective representations outwards into space; but things and representations are the same. They arise at the same time and are differentiated simply by the different arrangement and unitary composition of their constituent parts. Our knowledge of nature is not a symbol of something unknowable outside of us, but that outside of us itself, combined with the various special changes arising because my brain and not that of another person is connected with it. My psychical experience of this piece of nature is the cerebral process involved in the connexion mentioned. And, since naturally I can have such experience only by means of my own brain, I have knowledge of it only by means of myself, and call it the consciousness of my ego. The same occurrence, viewed apart from the fact that I am the subject of it, is called the physiological brain-process. (We shall develop this point later on.) When I perceive

the moon, the moon of the heavens does not engender in my mind an image, but the moon actually constitutes, as it is seen in the heavens, a part of the relations making up my ego.

In this view nature is never a finished thing but develops along with knowledge and under the constant correction of knowledge so as to form a system which gradually taking the shape of a connected web of phenomena subject to law becomes more and more distinctly separated from the phenomena of which we have experience in the individual systems of human bodies. The latter, however, never become absolutely severed from nature ; on the contrary, our knowledge of their mode of connexion with nature increases in exactness the more rigorously the laws of the phenomena dependent on them are ascertained. As our representations grow more precise, the more precise grows the system of objective nature.

The objective reality of natural phenomena is not impugned by these considerations, but the subjective reality of the world of representations is placed on the same footing with natural phenomena, in that both are shown to be jointly involved in the same development and are not the conversion of two different kinds of existence into one another. A body is nothing but a rule or condition determining that certain changes must be effected in space, and this we call reciprocal action with other bodies, or, to use the phrase of modern science, transformations of energy. It is implied in the same condition, that if the body comes into definite spatial relation with my human body, changes are produced in my body. On the other hand, my individual mind is nothing but a similar determinative condition, requiring that an extremely large number of changes in time and space shall form a unit experienced as "ego." Among these relations of time and space is found one which constantly recurs and which I call my body. Its changes, therefore, are experienced as changes of my ego, and hence I have experience of another body acting on my human body, as a change of content of the determined state called my individual mind. This "having experience" is simply a term denoting that a change of the system called my ego is taking place. But it is not another new species of existence added to the changes of my body; and if I distinguish

this kind of experience as mental or psychical from the changes of other bodies which are conceived as physical, my distinction merely implies a different grouping of the changes of reality; physical changes being such as are accomplished without the immediate intervention of my ego.

It is impossible to describe the immediate experience which every person has of himself, and by means of which he knows that he exists, or that a given content is undergoing changes. Colors, resistances, temperatures, etc., fill space and time as the qualities of objects; this fact, and the fact of their change, coupled with the state called feeling, is "having experience." As far as our experience extends, so far our ego extends. But whence experience originates, cannot be explained, because it is the original fact to which all explanations revert; it is the given occurrence, the phenomenon, which must be assumed. Experience, therefore, is the form in which the determined contents of time and space confront us. We know it only in our individual ego and nowhere else in the world; but we have irrefutable reasons for supposing its existence in numberless other objects, and to these we give the appellation of conscious beings or individual minds.

"I am a mind," therefore, means, "I experience something." This something which I experience is called the content of my ego; it is experienced. The content and the ego are not to be separated; the one without the other is unthinkable. In so far as the content is experienced as a unit, we have an ego, a mind, a thing which does the experiencing; and in so far as all unity presupposes multiplicity, which is one by virtue of that unity, we have a content, a thing experienced. The spiritual or the mental, therefore, produces no effects in the contents of what is experienced, it is merely the point of reference, the bond of unity, by which a definite content forms the system known as my ego. But everything I have experience of, I experience exactly as the content that it is. The changes which bodies, and with them my body, mutually suffer, are the determined relations in space which we call nature. Whether they are experienced or not affects neither them nor their laws. They remain exactly what they are and what we in scientific language

understand by bodies. When they are experienced by an ego, they are not transformed into something mental, but they simply make up by their connexion with the body of a man a new content, a compound of a more evanescent and undetermined kind, whose unity with reference to bodies still remains the law, but taken by itself as ego has that compound as its content.

The fact, therefore, that the phenomenon of experience, the existence of the ego, occurs in nature's domain of law, in the time and space determined world-content, takes nothing away from the necessity of events, nor from nature's rigidity and conformity to law. But the conditions of this rigidity are not to be sought in the unity of the ego, but solely in the unity of events, by means of which bodies in their varied relations of time and space are determined without reference to the fact that they constitute parts of the content of an individual ego and are the subject of experience in that ego. Or, it may be put thus: That same determined unity of relations which we know from experience, and in so far as we have experienced it, as the individual human mind, is denominated an objective body when it is regarded without reference to its having been experienced by an ego and is to be determined solely by its reciprocal relations and actions with other spatial systems. If we wish to emphasise simply the determinateness by law of a spatial system, as is done in natural science, we call the event in question a physical one; the same event is called psychical, where, as in psychology, it is presented as a component part of the experience of an individual mind.

The reader will now perhaps have a more precise idea of what was meant when I said that things and their representations were the same, differing only by the changes due to the participation of other systems. If I am dealing with physics, I say, there are material systems which have experience of themselves, but for my present purposes they do not come into consideration in this respect. If I am dealing with psychology, I say, all things are constituent parts of some consciousness. Changes which I experience psychically in myself are physical only for a second outside observer; but in so far as changes are produced hereby in the contents of the ob-

server's system, his experience also is altered. Men act psychically on one another solely through physical means. But this does not mean that there is a transformation of psychical into physical here, or of physical into psychical, but that given connexions in space get altered, and that psychical change simply signifies that kind of change which from the point of view of the individual system occurs in that system itself. The brains of men belong to a definite connexion of things in space, which for every one of these brains is partly the same, but is also partly disturbed and differentiated by other connexions. Hence the units which experience them are in accord in a certain measure, whilst they also present the common differences which separate individuals.

When I ascribe physical and not psychical existence to the moon, I mean simply that we are concerned with definite relations which are quite independent of their being experienced by any one ; and when I ascribe to my representation of the moon not physical but psychical existence, I simply mean that the aforementioned relations or parts thereof for the time being are joined with other relations which I experience as my ego. But they are on this account none the less physical even in this new connexion with the processes of my brain : and the aforementioned physical moon is none the less psychical in all cases where its objective law is *conceived* by some one. The moon is differentiated from my representation of the moon solely by the fact that now are formed into a unit just those relations which at the moment in question subsist between the condition of my nervous system and brain and the physical system moon. All this is the rigorously determined content of the system, and in so far I can call it physical ; but we can just as well say it is all psychical, by experiencing that content as a unit.

If we understand by representation not the represented content but a special activity, the act of representing, it would naturally seem as if something new were added to the represented content. But this rests on an illusion. No one will find in his consciousness, besides what he is representing, say moonshine, an additional special activity of representing ; he will find, perhaps, a new additional content, namely, the thought that he has before him a repre-

sentation and not an actual perception, that the moon as an actual fact is not above him in the heavens. Or, he will find, as, for example, we always do, when we are trying to remember something, a dark and obscure content, out of which some one part gradually grows more distinct. Or, he will be conscious of a feeling of effort, such as is associated with all voluntary change of representations; he finds this conation and desire itself; but all this, because he discovers it within himself, is to be denominated the content of his consciousness.

We may, indeed, unhesitatingly term the process of representation an activity because of its being associated with the feeling desiring it, with the represented aim. It would be only incorrect to maintain that we made something external internal by this representation; on the contrary all we do is to change the constituent elements of a content. We hear the sound but we cannot hear the hearing. In the act of representation, therefore, we have not to see a transformation of the temporal and spatial content of our ego by an activity of consciousness, but simply the actual process in the content, in so far as it forms a unit. If any one should say it was precisely this forming of a unity in the ego which he called the transition from the physical to the psychical, there need be no quarrelling about words. All that must be established as a matter of fact is that the expression "transition" is misleading. No change is produced in the content by consciousness except the changed arrangement of the component parts as units.

Or, perhaps the following objection will be proposed. When I look at the moon, I find in my consciousness brightness of definite form; I feel the beauty of the illuminated landscape; I have a sacred sense of rest; within me are sensations and feelings. But the physicist tells us, in space are only ether waves of definite periods of vibration, radiant energy which is transformed in the retina and in the brain into chemical processes; here there are only changes of energy in the nervous cells, expansions of the vessels, changes in the circulation of the blood. Where and how, then, does the physical of motion pass into the psychical of sensation, into feeling? For different they certainly are.

We have not expressed ourselves with sufficient clearness, if the foregoing objection appears valid. For this supposed objection is the very fact to explain which we have adduced all that has preceded, and have come to the following results.

Sensation and feeling are the content of nature as experienced when a human brain is parcel of the time and space system of law-determined phenomena. This same system is called physical whenever its law-determined connexions in space are considered without reference to their unity in an individual consciousness. It represents the relations as they must be conceived in a universal consciousness. Knowledge is the process in which multiplicity becomes unity in a universal consciousness, that is, is converted into a *content*, which as individual consciousness, as sensation and feeling of the ego, perceives itself dependent on the determinations of the universal consciousness and distinguishes this from individual experience as objective and physical.

III. THE SO-CALLED PARALLELISM.

Two students were discussing the meaning of a term in mathematics which involved the rate of increase of a sum of money the interest on which at the end of each term was compounded with the principal and then drew interest itself with the capital. One said: "Capital is a sum owing, which draws interest." "No," contended the other, "capital is a sum owed, a debt, on which interest must be paid." Which was right? Plainly both. A capital which is drawing interest is necessarily always an asset and a liability both; it must belong to somebody and it must be lent to somebody; a payment always presumes that the payment is made and received. But in the mathematical law which regulates the increase of the capital, there is contained nothing of this. For the law is not concerned with two different sums of money, but with one sum of money, which increases by a definite rule. The value of the result only is different, according as I have to pay or as I receive the same. For me, the individual, everything hangs on this condition; but the mathematical determination of the value is independent of whether I am debtor or creditor.

In like manner—for *omne simile claudicat*—it does not alter the determinative relations of things generally, whether the contents produced by such relations are objective happenings in nature or are experienced by individuals as sensations and feelings. Persons who regard the physical and the psychical as two distinct lines of development are like the person who regards a sum of money lent and its correspondent debt as two different sums of money, and who might be supposed to assume that the one was transformed into the other when possession changed. As a fact, the change consists entirely in the adoption of a new unit of reference, with which the same sum of money forms a different system. Similarly, the same change in space, if it be viewed as a determinative activity merely, is physical, but for the system changed it is psychical,—at least when this is a human brain, for otherwise we know naught about it.

That the human brain is not an apparatus in which spatial motion of molecules, or, to speak in more general terms, physical energy, is converted into sensation and feeling, is evident from the fact that this energy does not disappear as such, but is preserved in the physiological process, in the chemical transformations of the organism. When a stimulus excites our nervous system, the form of the communicated energy, it is true, is changed in the course of the nervous process. Mechanical energy is converted into thermal or chemical, and this again into mechanical, but it is always present as energy. For an outside observer who had it in his power to trace and accurately measure these transformative processes, the energy absorbed would still always be, and entirely be, energy in space. That we have during these processes the sensations of brightness or warmth, of pleasure or of pain, is an attendant phenomenon which happens as the experience of the person only in whose brain the transformations of energy considered take place. But no energy is consumed in producing this psychical effect; energy is only consumed in producing the physical effect. And this last is naught else than the quantitative spatial expression for the changes which are experienced in our individual consciousness.

It is the fundamental attribute of knowledge, its very essence in fact, that by it something undetermined is transformed into some-

thing determined. No reflexion can carry us beyond this original process; union of what is many into what is one—synthesis—is the fundamental form of all being; space, time, content, law, are its species. When masses distributed in space assume certain positions with respect to one another, this is simply the incorporation of a determinative state by the unity of a law, is synthesis, and when the results of thousands and thousands of years of human history meet in the ganglionic cells of the human brain, they, too, are compounded by law; here, too, we have synthesis. But experience shows us that this synthesis means for us sensation, feeling, or idea. The brain, therefore, is an apparatus not adapted for transforming a spatial synthesis of molecules into a psychical synthesis of representations, but it is merely that apparatus concerning which we know from self-experience that the spatial synthesis of the laws governing its motions is experienced psychically as a synthesis in consciousness. Synthesis, therefore, exhibits in this case two aspects, a physical and a psychical.

This is frequently expressed by saying that a complete *parallelism* obtains between the physical and psychical. The same event, viewed in its aspect of being determined by law, that is, viewed by an outside observer, is a physical event, but as experienced in itself as the unit of the system, it is a psychical event. Nevertheless, the term “parallelism,” as expressing the relation between the physical and the psychical, is not quite apposite, and it is preferable to avoid it; the following misunderstandings being very apt to arise on the assumption of such a relation.

Starting from the assumption that physical phenomena, or, as they are commonly termed, material phenomena, are the objective facts, these phenomena are held to be the original primordial reality which lies at the foundation of all existence, whilst psychical or spiritual phenomena are regarded as the inward aspect of the same. In other words, it is assumed that matter, whether in its ultimate particles or in certain complex units and systems thereof, is ensouled, possesses, that is, attributes of the conscious order. Hence all material phenomena are in their inward selves accompanied by con-

sciousness. In this form the parallelism-theory is termed hylozoism, or empsychosis of matter.

Or, it is assumed that physical and psychical are two forms of appearance of one and the same third thing, of one and the same unknown substance, whose attributes of extension and thought only are accessible to us. The law-governed development of this substance is the world-process, which presents to us, consequently, a double aspect—that of body and mind. This form of the theory of parallelism, which is due to Spinoza, frequently bears the name of monism.

Both views are untenable, because of their dogmatic character. They assume that there exists, antecedently to knowledge, a system of law-governed, determined states, of definite content, by reason of which nature and its parallel phenomenon, consciousness, are developed. But whether such system be termed, in the language of physical science, matter and force, atoms or energy, or whether in the language of metaphysics it be termed substance, identity, or something similar, it is always erroneously assumed that knowledge is indissolubly connected with, and absolutely limited to, the outward cosmical or metaphysical order, the function of the former being that of an empirical and psychological process, and it being supposed that the latter is developed and finished prior to all experience. In such event not only is individual consciousness, the empirical ego, indissolubly connected with nature, which is a fact, but there exists no other possibility for consciousness except that of developing under the necessity of her determinations. The demands of science are perfectly satisfied by this position; but it is utterly incomprehensible how the categorical requirements of the moral law and the freedom of self-determining persons is to be reconciled with natural necessity. Ethics, æsthetics, and religion would be converted, under such dogmatic constraint, into subjective illusions. The world would get its theoretical construction, but practically it would be inaccessible.

The critical view has freed itself from this constraint. In a certain sense it is permissible also in the critical philosophy to speak of the parallelism between the physical and psychical, but

these terms must here be understood in their critical signification. Physical and psychical phenomena, it is true, appear as two sides or modes of representation of the same synthesis, that is, as combinations of the many and the one, but in such a manner that their difference is precisely marked in the character of this synthesis. Previously to this synthesis, that is, without knowledge, both things and souls, that is, both nature and individual consciousness, are out of the question. Only in experience, that is, only through knowledge, are things as yet undetermined converted into things determined, and this is true of the psychical as well as of the physical. The separation of objects and of individual consciousness is performed within consciousness itself. Thus the individual consciousness, or ego, is subject to the same law as nature; psychical and physical phenomena belong together. But consciousness is not exhausted in them; forms of consciousness remain which are not identified with natural evolution. Nature is only a part of consciousness, and like the psychical it too is content of consciousness. The psychical is distinguished from the physical simply by its being content of consciousness of an individual unit, the ego, whereas in the physical this content is determined by the objective nature of the system without regard for its possible simultaneous relation with the unity of the individual consciousness. Hence in the one case the content is *experienced*, in the other it is *known*, and the last is termed physical. In neither case are we concerned with a content which exists by itself, but the combination of the undetermined many into one initially gives rise to the content. Whether the latter receives a psychical or physical character, whether it becomes soul or thing, is contingent on the character of the content, and we have in our own body an instance of a psychically experienced content which is known at the same time as a physical content.

The term "parallelism," on the other hand, is not supposed to imply that the analogy prevailing between physical and psychical phenomena is a thoroughgoing one. The fact is, that where unity is presented in the psychical (as in subjective sensation and feeling), in the physical the process is extremely complicated; and where indeterminateness is met with in the psychical, in the physical

determinateness prevails. We cannot, accordingly, refute the theory of parallelism, by showing that no analogy prevails between the two aspects. In the psychical, for reasons which will be immediately discussed, determinative aspects of the world-content appear which are lacking to the physical, namely, all the aspects which reveal the situation of the individual as a separate unit opposed to nature, and which we experience as feelings and impulses. Special conditions must be satisfied ere the unity of a system, as determined by natural law, is so narrowed down and concentrated that it becomes conscious of itself as an individual mind. Direct experience presents this case only in the complex of our own organism. If the conditions of the aforesaid unity are not fulfilled, then the physical process is not experienced in that system and we call it an unconscious process because it is known to us only as a physical phenomenon. The unconscious or non-psychical, however, denotes nothing but separation from my individual consciousness, and not separation from the determinations of the content of a universal consciousness. Here forms of determination abide which rank above the phenomenal world, empirically known to us in individual minds; physical and psychical events in time and space may be conceived as the co-ordinated means, by which the free self-determination of persons is developed under the guidance of reason. In this way the critical view meets the requirements of scientific cognition by exhibiting nature both in physical and psychical respects as a necessary system determined by law, while it also preserves intact the freedom of persons.

IV. THE LAW OF THE THRESHOLD.

If, agreeably to the preceding remarks, psychical events also be installed as parts of the order of nature, it is incumbent upon us to clear up the peculiar difficulties which the individual mind offers on such a theory. Why is the ego experienced as an undetermined and vacillating unity, such as I know it in myself, a frail, perishable, and erring man? If psychical experience is a unit of the same kind as the physical system, but as observed so to speak merely within itself, why do I not experience *all* of nature, as it

actually is? You tell me it is the real moon which I receive into my ego in vision; consequently the whole universe must be contained in me, its laws must be clearly revealed to me, in me all life and action is, and I ought to be able to penetrate at a glance the secret of the world. Nature is a unitary coherent system determined by law; but I am ignorant of it. The movements of the atmosphere are determined by fixed relations obtaining between sun and earth, water and land; but the sailor on the storm-tossed ocean knows nothing of this necessary connexion; the result of the storm is undetermined for him, as is also his fortunate rescue in the harbor. Motions of bodies, waves of sound and light, are impinging incessantly on my body, but I notice them not, although they are certainly present. The physicist determines fractions of milligrammes with exactness, but I cannot tell by the mere weight whether you have placed one hundred or one hundred and ten grammes in my hand. The world goes its way but I sleep; or I strive hard and learn nothing. The physical unity remains preserved, the psychical does not. How is this relation of the individual ego to nature to be explained?

And further, if my individual consciousness is found to depend on nature, how am I to understand the attitude of the critical view which ascribes to personal consciousness a position above nature? Is it possible that there is a second consciousness in me besides my individual consciousness which is independent of nature? If this were so, we should have to surrender all that we have discovered to be conformable to law. Absolute anarchy would prevail in my ego, I could acknowledge in myself at will the law of nature or a power above nature. My individual ego, says the critical philosopher, is a parcel of nature, yet above it stands my free, self-determining personality. What can be the meaning of such a view? What is this personality if it be not my individual ego? What am I to understand by personality? What relation does my individual consciousness bear to this "personal" consciousness?

In the realm of natural science there are no persons, but only individuals. The natural scientist, therefore, has nothing to do with this last problem. Only when we propound the question of

the relations of natural science to ethics, æsthetics, and religion, does the notion of person enter. And to put this notion of personality, or, if we prefer it, the law of reason, in a clear light as contrasted with the law of nature which is implied in it, is the task of the critical theory of knowledge.

As regards our main theme, this task stands somewhat in the background ; but we must at least make a passing reference to it. Here the great difficulty is encountered of clearly and popularly distinguishing, without undue use of technical language, the notions which, owing to insufficient abstraction, we are accustomed to associate with the words "self" or "ego" and "consciousness." Language takes her designations from direct experience, and although she gives to them metaphorical meanings when they are used to describe abstractions, yet the linguistic sense always discovers remnants of the original elements therein, which disguise or pervert the meaning of a thought. And not infrequently a suitable word is missing altogether. It may be true that often

"Where fails the comprehension
A word steps promptly in as deputy."¹

but in philosophy it is usually the reverse ; the ideas are there, but the word cannot be found which expresses them succinctly and lucidly.

Thus there is wanting in familiar speech a common term for the physical and the psychical. I have used the phrase "content of consciousness." I might also have employed the word "appearance" or "phenomenon." But these terms are always subject to misconstruction. In the case of content of consciousness we are always prone to think of something subjective, of the content of some *individual* consciousness. It then seems as if we desired to make something psychical out of the physical, whereas we only wish to say that they signify or involve the same content, the latter differing only in the manner of its appearance in different unities. On the other hand, if we use the word "appearance" or its common Greek form "phenomenon," we are constantly subject, in us-

¹ "Faust, Part I., Scene IV.

ing this terminology of Kant, no matter how forcibly we may struggle against it, to the misconception or impression that we are speaking of *appearance* only, that the phenomenon is not what had actually happened, the actually existing thing, but its mere semblance or illusion. And after we have happily explained that phenomena are designed to describe not apparent but actual experiences, the obstinate opinion is awakened that there must still be something at the basis of the phenomena which appears in them. But that again is not our meaning. As was shown above, physical and psychical are not phenomenal forms of an unknown third thing, but they are reality itself in time and space. Hence we must avoid this term and try to get along with the simple word "content."

That which distinguishes one individual from another is solely his content. The beggar and the king, the dolt and the genius, the uneducated man and the scholar, any two persons whatsoever, are different simply because different contents form coherent unities in their egos. Not the attribute ego distinguishes individuals; on the contrary the attribute ego is precisely what they have in common; the beggar and the king, Tom, Dick, and Harry, all know and are conscious of themselves as egos. What makes them not the same ego is the possession of a different time-and-space-determined content. The one lives in the dirt and squalor of the streets, is barely successful in maintaining his existence, while the circle within which his wants are included is narrow and restricted. The other lives amid the gorgeous splendor of a palace; his richness of content fairly overwhelms him; far-reaching and enormous are the effects produced when changes take place in his consciousness. These are extreme examples of the difference of content of two individuals. It is characteristic of all men, however, that a definite configuration of things in space, called the bodily organism, is part of the content of the human ego, and that everything that is to become parcel of this content must fulfil the condition of being connected with this body and with its central nervous system. This organism, whose development we can trace back to systems of a very simple order, cells and protoplasm, represents the unity of the system which we immediately experience; while the totality of the

content thus brought into the proper relation for the purpose, is our experience, and is called, in so far as it is conceived as a unit experiencing itself, our individual mind. This ego, which is consequently nothing else than a content of definitely determined states in space and time, is a part of nature in which nature experiences itself.

But it is a part only. Thus we answer the question why we do not experience nature as a law-determined system of physical changes, but simply as a vacillating psychical phenomenon. As individuals, we are such a part of nature that only quite determinate and select changes are able to modify our content. It is well known that an excitation which strikes the ends of our nerves must have a certain strength to be perceived. The least limit which must be reached in order to produce a modification in the content of our ego, that is, a modification of the organic system accompanied by consciousness, is called the threshold of excitation. The threshold varies in magnitude for different sense-organs and for different excitations, as for sound, light, heat, pressure, etc., and it even varies with individuals and with their moods and conditions. Practice reduces the threshold of excitation, increases the sharpness of the senses. Fatigue raises the threshold, while sleep augments it to such a degree that only powerful stimuli are able to cross it and reach consciousness.

A stimulus is an exchange of energy between our environment and our nervous system. This exchange is objectively immeasurable, even when subjectively we are unable to perceive it. A drop of acid in a large quantity of water is chemically detectible long before it is perceptible to the sense of taste.

And in still another manner are we insensible to changes in our environment. If we compare two different stimuli, each of which alone is perceptible, for example, a pressure of thirty and of thirty-five grammes exerted on the palm of the hand, we shall not notice that the two stimuli are different. The difference between the two must reach a certain magnitude, in our example, some ten grammes, before we are aware that we are dealing with two different excitations. The least limit in this case is called the threshold of change

of excitation. It is generally proportional to the magnitude of the stimuli, so that for example, in order to perceive any increase in a pressure of three hundred grammes, the pressure must be augmented to four hundred grammes. These two experimental facts, the existence of the threshold of excitation and of the threshold of change of excitation, are together called the law of the threshold.

This law of the threshold is simply the scientific expression of the fact that we are individual minds ; in other words that the unit of which we have experience does not comprise the whole universe, but separates our ego as a distinct system from the law-determined totality of the world. Its upshot is that this special unit of which we have experience is merely a small and limited section of the total content of the world and can never comprise within itself all the relations of existence. It involves the condition, therefore, that our individual consciousness as a specific content is different from the universal determinateness of things which holds together the remotest parts of space and time ; and in this manner it marks out and characterises the real difference between the physical and the psychical. Psychical, that is, our individual experience, is that portion only of the world-content which passes the threshold, and since we know that there are changes of pressure, temperature, extension, motion, etc., which we do not perceive, all such changes are called physical in contrast to psychical.

In the physical world there is no threshold. The laws of the physical world can be expressed in mathematical equations. By means of the latter we calculate the interchange of energy between the different parts of space. The laws can be determined with accuracy which apply to indefinitely small differences. It is true in every actual case finite limits are set by the conditions of the problem beyond which the calculation does not hold because of the altered conditions of the problem. But so far as the mathematical character of the quantities are concerned, no such limits exist. Pressure, temperature, volume, energy itself, can be conceived with differences which decrease indefinitely. Take the acceleration of a falling body, the augmentation of the temperature or pressure of a gas ; mathematically considered such quantities are continuous,

that is, their laws still hold good, even if one of them be altered only by a vanishingly small fraction of a millimetre, degree, or milligramme. And so we assume that every change, no matter how slight, does, as a matter of fact, although inaccessible to observation, exercise its influence on all parts of the universe. Theoretically considered, the fall of a grain of sand raises its temperature, and the heat therefrom is radiated to the farthest nebulae of the heavens. This, in fact, is the meaning of the infinite, physically necessary connexion of the All.

But this is altered when the unity of the individual mind is taken into account. The individual mind is a system which, by the law of the threshold, is cut off as a finite unity from the infinite workings of the world. The extremely small rise in temperature, for example, which the moon produces, is physically determinable, yet no man is ever directly aware of it. Doubtless it has its effects upon our body as much as upon any other; but it is not present as sensation. Every exchange of energy between our body and its environment must produce some modification in the former. Viewed in this aspect, we term such a modification, as before said, a physical change. We call such only psychical which we experience as sensation. Therefore, a part only of the energy of our nervous system goes to form that unity which has experience of itself. This part is called psycho-physical energy. The phrase indicates that this energy is physical, but at the same time that it is a modified portion of the total energy of the system, viz., that which we psychically experience. We may assume that a peculiar structure of the central nervous system, as also of the sense-organs, conditions this limitation of sensation, which we call the law of the threshold.¹

It thus happens that we are finite minds which, as compared with a universal consciousness, have experience of fragments of the world only. In this manner our perception is restricted, more unsafe, and erring. In this manner the content which we term our ego, is undetermined. In this manner nature becomes an infinite

¹ Compare the author's paper on "Psycho-physical Energy and Its Factors," in the *Archiv für systematische Philosophie*, Vol. I.

problem for us, whose broad conformability to law we can never approach more than approximately. In this manner our subjective knowledge of nature is distinguished from objective conformability to law, which we presuppose in nature. But on this very fact, which shuts us off as finite minds from the universe, hinges our existence as conscious beings. The law of the threshold protects us against the constant and endless inundations of stimuli that flood the universe. In the structure of the organism they are gathered together into a law-determined system which by its very restrictedness is able to be preserved as a discrete unit, such as has been developed by the interaction of cosmic stimuli. In virtue of all these we are an ego, and recognise ourselves as such in contrast to nature.

Here, too, the difference between nature and individual mind as a mere difference of contents is emphasised. In nature we have a content in which each part is determined by all the relations which it bears to all the other parts. The moon is determined by all its relations to the earth and to all the heavenly bodies, and by its relations to its own parts (that is, in its chemical and physical composition), and by its relations to all nervous systems wherever and however existing; and so forth. Thus the moon is exhaustively and necessarily determined, and that is objective nature. On the other hand, we have in our ego a content which is determined solely by a limited number of relations, namely, by such possibilities of interchange of energy as pass the threshold of this particular nervous system of mine; and thus this ego is not exhaustively determined, and thus it remains subjective experience, appurtenant to me especially, and subject to untold contingencies.

V. THE FEELING OF FREEDOM.

We have repeatedly stated that "the experiencing of a thing," in which we are accustomed to see the difference between mind and body, is merely a difference in the character of the compounded content, but induces no modification whatsoever in the real essence of the content. This fact must be borne in mind if we wish to understand the critical view. The fact of a given content forming a unit with our nervous system is identical with the fact of its being expe-

rienced; no other change is effected, so far as the space-and-time-determined condition is concerned; that bright, round object in space remains that bright, round object in space. However, a new attribute is imposed on the content, due to its forming a unit. The unity involved in this content belonging to my ego and not to another, is experienced along with the multiplicity of the content. This attribute which we experience only in ourselves is *feeling*.

By feeling we understand the consciousness of possessing a given individual content or of *being* such. The content itself in its aspect of multiplicity we call *sensations*. These, however, unlike feeling, are not merely the referring of things to the unity of the ego, but are determinative states in space and time. Bright things, smooth, heavy, warm, and sweet things have always a definite location, and are hence objective; only in so far as this location and its quality are parcel of the content of my ego, are they also subjective and specially referred to one another as *my* content. And in this unity they are experienced as mutually determinative. Herein lies the feeling of pleasure or pain. Feeling, consequently, is that by which I am distinguished from other individuals and from nature. For this new unity to which my nervous system belongs exists only once. And because precisely I am this unity, it is for me the starting-point of all existence; it is that by which I know that I am; and consequently it is that which gives *value* to existence generally.

In feeling we have the direct relation to one another of determinative states of content, which we experience in ourselves as pleasure or pain; but we are always conscious of them as connected with changes in the content. But whether a definite change of content is associated with pleasure or pain for us, depends entirely on the character and present mode of determination of the ego-content in which the change is effected. The odor of roast beef is pleasurable to a hungry man, but painful to one who has thoroughly satisfied his appetite. Moonlight fills us with pleasure during a walk at night, but it may be that in some cases we should prefer darkness. Yet the odor of roast beef remains a definite quality and moonlight likewise remains a definite quality, to be found by nat-

ural laws in a given place at a given time. By natural law my organs of sense are also in a given place at a given time; by natural laws the same sensations are experienced; and by natural laws these sensations mingle with the entire remaining part of the content of my ego and give rise to a unity which, conformably to natural law, I experience according to its constitution as pleasure or pain. Hence this feeling also is *determined* from the point of view of nature, but only as regards the last-mentioned *infinite* system. It is *undetermined*, because undeterminable, for every *finite* system; seeing that it is impossible to know the exact state of things at which the new content meets the old. And so, through feeling, we experience immediately that indeterminateness of systems which is conditioned by the law of the threshold. Accordingly feeling is the infallible sign that a given content is part of our ego. But this is an experience of an entirely different sort from considering this content under the point of view of knowledge. In the last case the connexion is theoretically determined, that is, every content is conditioned by another and is necessary as regards the whole of knowledge, but always presupposes as the condition of its existence a second preceding content. In feeling, on the contrary, the content is directly experienced as unconditioned, and so is not determined by law, although absolutely certain in itself.

On the other hand, if we consider a system, be it the moon, our own body, or that special content which we call our ego, not as directly experienced, but in its broad connexion with nature, then we are no longer concerned with feeling; the unity which now determines the connexion is the unity of law, wholly without regard to whether it is experienced or not experienced by any system. It is the inevitable consequence of the scientific mode of view that it excludes feeling from the systems investigated by it. Hence result its determinative rules regarding nature in consequence of which as compared with the individual mind it appears to be something external. As we have seen, however, this contrast, so far as regards the content of nature, is not justified. The same qualities which form our ego are likewise those that are present in nature; we simply abstract from the fact that they are associated with feelings.

As before, the objection is invalid that in nature we have ethereal vibrations and energy, while in me there are light and brightness. In fact we have overturned this objection ; the two are in me and in nature at once. What is it that is bright? Not my eye, my retina, nor my *corpora quadrigemina*, but that spot in space. Not the sensation that here there is something round, red, white, and fragrant which we call a rose—not these qualities are subjective, but only the feeling associated with them, that the content which I call my ego at any and every moment has suffered alteration in the manner described. Sensation is objective in so far as actual relations make their appearance at this definite spot of space, which bear in them the determinative conditions of round, red, white, and fragrant. But it is always tacitly involved in the assumption of these determinative conditions that they never reach their complete stage as qualities until they are brought into connexion with the sensory organs and the brain of a human being, that is to say, unless certain processes in the nervous system take place at the same time.

Owing to this limitation, qualities have been termed subjective. Yet their reality is evidently assured even without and previously to connexion with the nervous system ; only the attribute of being experienced is then lacking. This reality, independently of the nervous system, is also exhibited in various other connexions, as for example, in the biological, with the development of the stem of the rose, in physics and chemistry as a body of such and such weight, and such and such constitution ; in this last connexion with physical knowledge, it is defined as a structure of spatially determined quantities of energy. Since here all reference to the nervous system is omitted, whilst with the expressions “red” or “white” that reference is implied, the first reality is termed objective, or body, and the second is called specifically sensation. And owing to the contrast involved, sensation is termed subjective. But obviously it is as much objective as the connexions wherein energy is concerned, and is differenced therefrom solely by the fact that the latter distinguish the body “rose” as the system “rose-nature,” whilst sensation, although also characterising the body “rose,” marks it out as the system “rose-brain.” All is a difference of content.

In the system rose-brain, the rose is experienced : the qualities red, fragrant, etc., are associated in time and space with the feeling which marks our ego as a unit. In the system rose-nature this is not the case, but there exist here the absolute conditions determining the rose as an objective body unrestricted by the law of the threshold. Sensation, however, still persists among the attributes that mark out this particular spot of space as a rose, and only its sentient aspect is missing. The law-determined connexion of qualities still endures. Yet, inasmuch as the mere assignment of quality is not sufficient for determining the parts of space in their natural connexions, physical science has resolved them into determining conditions of mainly a quantitative kind. Yet it must not be thought that on this account qualitative states have less objective reality than quantitative states ; they merely, but always, signalise some possible reference to a human ego, and are consequently not determinable with sufficient distinctness by themselves.

When the same part of space is determined on the one hand (psychically) as "red," and on the other hand (physically) as an ether-vibration of 0.00007 cm. wave-length, we are not concerned with two different processes wherein the ether-vibrations are transformed in the brain into the sensation red, but merely with two different relations of the same fact. "Red" marks the relation in which the given spot in space stands to the content of an ego when the necessary connexion is established with the human brain ; the vibration of the ether, on the other hand, denotes the relation in which the same spot in space stands at that moment to every other spot in space without reference to a human brain. This last relation as a mathematical determining rule is alone able to assign exact and determinate data regarding the condition of the aforesaid spot in space at the moment in question. The relation characterised by "red" does not destroy the objectivity of the state considered, but suffers it to be connected with the system called the ego, as a state of the same, which from being an individual mind is always undetermined. Hence, a scientific theory of colors was not reached until it was learned to determine colors quantitatively. But it should not be forgotten in this connexion that the character of the colored spot in

space has not been changed, and that it is unnecessary for the red to be produced by the vibration of the ether. Quite the contrary, the vibration of the ether is simply a means of defining a given spot of space as it exists under given conditions, without being obliged to take account of its special relations with a human brain.

It is, in fact, the very problem of science so to define the single contents subjectively made conscious to us in sensation, that they shall hold good and be subject to determined law as objective contents. In so doing, we do not destroy the element of sensation, we merely make ourselves independent of its connexion with feeling. When we have succeeded in defining all sensations in terms of the interchange of energy between parts of space, or, as mechanical physics strives to do, in terms of the motions of atoms, then the ideal has been reached of ascertaining changes in space without resorting to their nature as experienced in the ego. In fact, this would be a perfect ideal of natural science, for if achieved all subjective indeterminateness would be excluded. In the case of colors and sounds objective definition of this sort has been accomplished. If, now, we attempt to revert from our physical determinations as thus made, to the qualities originally sensed, it is obviously quite redundant to ask how sensation could have been generated in the brain by mechanical processes, because the mechanical processes themselves are merely the analytic product of what was originally given as sensation in such and such a spot of space and at such and such a point of time.

The further the process of objective definition is carried in science, the more distinctly the mechanism of nature is separated from the indeterminable system whose content is experienced in feeling only. In fact, the growth of science has shown that a remnant is always left over in the ego which is incapable of being resolved in the fixed terms of natural science. We have seen how, in the human organism, by the law of the threshold, a content has been marked off within nature which actually cannot be determined—namely, the individual mind, which is called an ego. But even this indeterminableness is itself nothing more than a fact; were it possible to see to the bottom of all the relations of this content, then

the whole content of an individual mind would be determined. However, this possibility is never realised.

By my having laid stress on indeterminateness as the attribute by which the psychical content of our ego is distinguished from the physical, and by my having called the individual mind in a scientific sense an undetermined system, the reader will perhaps entertain the suspicion that I have been endeavoring, on the strength of this indeterminateness of individual psychical things, to open up a back door by which to smuggle freedom of will into the necessity of nature. But this is far from my purpose and would be tantamount to a lapse into dogmatism. In nature, and hence in the individual empirical mind, there is no freedom. The individual is merely a piece of nature, and to attribute freedom to it would be equivalent to destroying nature.

Yet one gain we have made—we have explained why, despite the fact that the determinateness of nature prevails in the individual mind, we have yet the *feeling of freedom* therein. Natural necessity is assumed to assure the existence of units in time and space, and we know consciousness simply as such an experienced content in time and space. It may be called the empiric content. We are not, however, able to point out everywhere in this content of our ego the necessity of nature. And yet the ego-consciousness persists. In our empiric consciousness, therefore, natural necessity is implied as the pre-condition of the existence of our individual mind, yet only in so far as we recognise ourselves as an individual in the general connexion of nature; in other words, this necessity is the *theoretical* condition of our individual existence. Practically, however, these conditions are never perfect. If we were referred for our existence to natural necessity, if we had to demonstrate theoretically our individual existence, this latter would always remain open to question; there is no expedient for proving from natural laws that we exist because every law presumes new conditions and so reaches back indefinitely far.

Fortunately, we are never under the necessity of proving our existence to any one, as it is sufficiently assured us through consciousness—not through theoretical consciousness, but through ex-

perience. The psychological form of consciousness in which our existence is immediately known is feeling. Feeling, therefore, is a form of existence in which our individual mind is free from its determinateness by natural law. For from the point of view of nature, that is, on the ground of theoretical knowledge, infinite conditions must be fulfilled before our existence is assured ; but in feeling it is assured without all those conditions being fulfilled. It is true, we do not know from this source *how* we exist, but it is simply brought to our knowledge *that* we exist. We have experience of a content without having to wait to have knowledge of it. If we make feeling itself the object of knowledge, it is necessarily determined by this fact itself ; if we ask, for example, why we now have just this feeling, fear, or joy, we find that the content in question is joined with natural conditions. But the ascertaining of these conditions is not experienced ; in my ego it is not present—at least, it is not present for feeling—and hence I *feel* myself free.

In other words, although theoretically I am only relatively determined as an individual, because the infinite conditions of my existence in space and time are never completely achieved, yet I find in feeling determinative grounds going to prove my existence, which are of absolute validity. Feeling, accordingly, is the sign that I am not only dependent on nature in my theoretical determination, but possess a practical determination. The determinations of consciousness are not exhausted in my empirical consciousness, but such only as are appurtenant to knowledge in space and time. Natural necessity determines *how* we must exist *if* something else exists, and again, what conditions must be fulfilled to this end, and so on *ad infinitum* ; in so far it is the supposition of our existence. But it has itself a presupposition, namely, consciousness. It presupposes that consciousness exists, that there are determinative states and synthesis, and then only does it explain that our individual consciousness must be so and so, and has this or that content. It cannot, however, be theoretically shown that this presupposition is fulfilled, but we are certain of it by feeling.

There is therefore a synthesis, the self-feeling of our ego, which is itself the presupposition of nature and therefore the presupposi-

tion of our individual existence. It is to be carefully noted that no such vicious circle as the following is involved: the ego conditions nature, and nature conditions the ego. The first ego, the self-feeling ego, and the second ego, the ego conditioned by nature, are two different things. The ego conditioned by nature is our individual existence in space and time which as shown above is determined solely by its content. But the ego as self-feeling is that universal ego which is alike parcel of all individual egos however differing in their content. The empiric content only is determined by natural law, but egoness as such is an autonomous determination in consciousness whereby the determination of content (that is, of the one from the many), and hence nature, are originally possible. It affirms that individuals *shall* be; but individuals can be real only in content, in nature, in space, and in time.

Thus feeling exhibits natural necessity as a means, the object of which is the ego itself. It shows that although everything which we experience in space and time is necessarily determined as content, yet the experiencing ego as the determining unity therein is not resolved but refers its finite conditionedness to something unconditioned. Not that we could have experience of something that is not necessarily determined in nature; but our *having* experience of anything at all must repose on foundations not embraced in the necessity of nature. Otherwise it would not be intelligible how we could exist as experiencing beings and be absolutely sure of this existence, whilst yet natural necessity is never given with all its infinite conditions in the empirical consciousness.

Our existence, accordingly, must repose upon a law which is independent of the natural law that determines the content of our experience. For in determining *that* we exist, the law anticipates the aim sought, as to how we must exist. Such a law which prescribes the direction in which our experience has to develop is called an *idea*.

As the idea assigns the point of view under which experience is originally possible, it is, as accords with its character, never fulfilled. But the feeling of self is a sign that we ourselves represent such a unity in which the conformability to law that is never ac-

complished in experience is made conscious as a condition which is bound to be perfect. Such a unity which absorbs the law with the consciousness of carrying it to completion in itself is called a personality.

As a consequence of the limitations due to the law of the threshold we are individual minds, and as such, parts of nature. Yet as we grow conscious of this limitation and are still cognisant of our ego as the object for the sake of which the natural necessity controlling our individual existence is embodied in the unity of our ego, we lift ourselves above the limitations imposed by nature. We know ourselves as the unity in which an idea is being realised, to which nature is subservient as a means, and which consequently is itself determined by nothing else. This very personality has no beginning and no death, and no place in space ; for time and space and the individual development of consciousness thereby conditioned exist for the self-ends of personality. Personality for this reason is never met with in the empirical realm, except in the personal belief in the reality of ethical, æsthetical, and religious self-determination of humanity.

KURD LASSWITZ.

GOtha, GERMANY.

THE NATURE OF PLEASURE AND PAIN.

GENIUS, which Schopenhauer regards as a state of mind that is ill adapted to the world, is classed by Lombroso in the same category with crime and insanity; while Griesinger denies that there is any reliable criterion of sanity, declaring that the question whether or not a man be insane is "in many cases absolutely devoid of meaning." Because "the organism is constantly oscillating in its functions," Claude Bernard argues that the normal state, being an ideal form which is never fully realised, is "a pure fiction of the mind."

These views apparently result from philosophical premises which are tacitly assumed, and it would be difficult to trace or define them in each case; but this much seems sure that they exhibit a neglect either of the importance or the actuality of form. Schopenhauer regards form as purely subjective, or, as he calls it, "ideal"; to him the objective world is devoid of time, space, and causality, or, in a word, devoid of form of any kind. Claude Bernard and Griesinger are probably, like so many naturalists, under the sway of the old nominalistic philosophy which views the world as a chaos of innumerable particulars and, denying the objective reality of formal relations, considers universals not as a description of *things as things are* but as mere mental fictions invented for the convenience of classification.

In opposition to the nominalistic mode of thinking, we propose a philosophy that emphasises the objective reality and the importance of form. The terms "matter" and "energy" are symbols denoting certain invariable constants, and cognition is ultimately always a tracing of form and formal law. Counting, measuring, and delineating the effect of configurations are the methods of science.

Thus the philosophy of form is the philosophy of science; it is a new Positivism explaining the methods of science and deriving them from the formal elements of the facts of experience. If form were purely ideal and subjective, the objective world could never be explained, things would be unknowable and the ideal of science could never be realised—in a word, philosophy would be bankrupt and agnosticism alone would be the right world-conception.

From our standpoint the solution of all scientific problems must be expected from a consideration of form; and we are inclined to predict failure whenever on any account form is left out. Thus sanity and insanity must be regarded as a problem of relation. Sane is he whose mental images picture reality correctly. The question is a case of similitude and proportion. Truth is sanity; untruth, if established as a permanent habit, is insanity.

Genius is the disposition of an exceptionally normal mind,—of a mind which at least in one domain reaches an unusual degree of perfection. It frequently happens that a man's excellency in one line is accompanied by many drawbacks and shortcomings in other lines; and as a bright child is easily spoiled, so a genius will be suffered to indulge in many eccentricities. But let us remember that perfection of some kind, whatever it be, and not abnormal deficiencies nor whims ever constitute the nature of genius.

Schopenhauer fosters a concealed dualism in his system, so that to him moral actions, the ideals of art, and love of truth, appear out of place in this worst of all possible worlds in which we live. He regards the normal man who is adapted to the conditions of life as a brute, and both the genius and the noble-minded man as abnormal.

Lombroso seems to take his stand upon the principle that normality must be identified with the average type. The greatest number of individuals is decisive in the determination of the character of a whole species. Thus genius being a rare instance is as much abnormal as disease and crime. While genius ought to be regarded as an exceptionally perfect instance of the characteristic features of a type, Lombroso and his school class it together with all extremes in the category of abnormal conditions, which thus becomes a heterogeneous collection of all the cases that do not belong to the average.

This mode of classification omits considering the value of each single form and lays too much stress upon counting the number of individuals. There is a streak of nominalism in it which is analogous to the political superstition that questions of right or wrong can be decided by a majority vote.

* * *

After these introductory remarks we are prepared to estimate the importance of form in a consideration of the pathology of pleasure and pain, which was discussed in the last number of *The Monist* by one of the ablest and most judicious psychologists of to-day, nay, of all times, Prof. Theodule Ribot.

Professor Ribot follows Féré in his determination of morbidity in emotional states, which, he says, is produced in three ways: (1) by extraordinary intensity, (2) by the lack of a sufficient determining cause, and (3) by undue prolongation.

The first and third point, which play the most conspicuous part in Professor Ribot's explanations, give the impression that his determination of morbidity is throughout quantitative, since it consists always in "too much or too little," be it in intensity or duration.

Either Professor Ribot fails to discuss the second point or I cannot discover a clear exposition of it, except perhaps where one of Dr. Dumas's patients is mentioned as attributing "her incurable despondency in turns and without sufficient reason to her husband, to her son, or to the work which she feared she was neglecting." However, this condition, as all cases of a similar kind, are not instances "without a sufficient determining cause," but examples in which the patient attempts to justify his or her melancholia by presenting all kinds of fictitious causes. Otherwise, the second point, too, seems to be quantitative; for it is characterised as a "disproportion between the cause and the effect felt"; as, for instance, "a patient suffering from nostalgia thinks only of his country or home, and those afflicted with religious melancholia only of their salvation." This would mean that disorder is caused by the undue prominence of one emotion which thus dominates the whole economy of a man's psychic life.

No objection can be made to the proposition that every "too much" and every "too little," be it in intensity, duration, or in disproportionate effectiveness, will result in a morbidity of the emotional conditions; but the more important factor that produces mental diseases is not the quantity or partial preponderance of certain phases of emotional life, but its quality; it is error, illusion, or, generally speaking, the non-congruence of a representation with the things or conditions represented. Of course, error as such is not as yet a disease or alienation, but it produces a morbid state of mind as soon as it becomes constitutional; that is to say, a fixed determinant for action, developing an incurably wrong habit which naturally will appear as a fixed idea.

The quality of our ideas as well as of the reactions that take place in response to the various stimuli of the surrounding world are more important than their intensity; because their adequate or inadequate relation to reality constitutes the basic and most important criterion of sanity and morbidity; and when speaking of quality the expression "too much" has no application. Here it becomes apparent that as there can be no disease which consists in "excess of health" (an expression used by Professor Ribot), so genius cannot be abnormal on account of possessing too much of the normal. Can an image be wrong because it is extraordinarily faithful to the original, or can a proposition be false because it is too true?

Pleasure and pain are treated by Professor Ribot in the same way as sanity and insanity. Pleasure is looked upon as an increase, pain as a decrease, of vitality; and Professor Ribot by no means stands alone in his view. Indeed, almost all psychologists are in the habit of accepting without argument the traditional definitions which identify pleasure with growth, health, expenditure of energy, or beneficial actions; and pain with decay, dissolution, abatement of vitality, or harmful actions. If pleasure were indeed identical with growth and health, and pain with decay and disease, how could we speak of the pathology of pleasure and pain? All pleasures would be healthy, all pains symptoms of morbidity. Yet this is not so! The fact that pathological pleasures exist stands in contradiction to Professor Ribot's definition of pleasure, and, when writing on the

pathology of pleasures, he feels under obligation to justify the term and to escape the reproach of inconsistency by saying :

"If we admit that pleasure and pain always exist by virtue of simultaneous and contrary processes, of which the sole difference exists in consciousness, it is sufficient if one of the two processes augments or the other diminishes abnormally, for the difference also to alter in favor of the one or the other."

He adds :

"Unquestionably, the ultimate result is a contradiction of the rule, because in the cases considered the surplus which should be negative (pain) is positive (pleasure)."

Would it not be advisable to abandon for good the theory that pain is negative and pleasure positive? Nor would it do, with Schopenhauer, simply to reverse the statement and regard pleasure as negative and pain as positive. For it is not the relation of quantities alone which determines pleasurable or painfulness of feelings, but the peculiarity of their forms also.

The old conception of pleasure as growth, or as positive and beneficial, and of pain as decay, or as negative and destructive, is generally adhered to, in spite of the concessions frequently made, that many morbid states produce pleasant emotions; that growth is sometimes a painful process; that dissolution in death is, when the death-agony has been overcome, as painless as falling asleep; that rest is as much a pleasure as exercise; that healthy exercise appears disagreeable to those not accustomed to it. Pleasures as much as pains are both positive and negative; and what is pleasurable to one is painful to others. Under these circumstances a revision of our conception of pleasure and pain would be advisable, and we venture here to submit in outline a new theory of pleasure and pain that would be free of the inconsistencies and contradictions of the old view.

Pleasure and pain are feelings, or subjective states; they are the psychical accompaniments of physiological processes, and whether a physiological commotion will be pleasurable or painful apparently depends upon the relation which the commotion bears to the structure in which it takes place. Every commotion leaves a definite trace in the living substance, forming a disposition which

when stimulated revives the feeling that accompanied the original commotion. The repetition of the physiological act means the revival of its analogous psychical state ; and the preservation of peculiar forms of commotion is the condition of memory.

Pleasure and pain presuppose the presence of definite structures or dispositions in living substance, and therefore it seems plausible that the first commotions which determine the aboriginal and initial modes of life, ought to be neither pleasurable nor painful, but simply unconscious. Feelings when absolutely isolated are no feelings. A feeling must *be felt* to be a feeling. For feelings to arise, there must be an interaction between two or several sentient commotions. The new commotion must meet and revive the memory-image that ensouls the trace left by former commotions. Thus the feeling of pleasure and pain depends upon memory, and memory is due to organisation.

Now, a vivid commotion either may or may not be of the same kind as former commotions ; it will either fit the structure, or disturb it, by jarring the trace previously formed. The former may be regarded as representing the primitive condition of pleasure, the latter of pain, while a commotion that is not vivid because it is neither intense nor accompanied with attention sinks into the realm of indifferent states.

Structures built up by a constant repetition of commotions of a certain kind constitute organs ; and the activity of organs, which naturally depends upon their structure, is called function. According to the theory of evolution, we regard the whole organism as the product of inherited and acquired functions, built up in the course of ages. The functions of an organism having arisen in response to definite and constantly repeated stimuli, attend to the various needs or demands of life, and pleasure appears to be nothing more nor less than the gratification of some want, while pain is due to a disturbance of some kind. But in the measure that the satisfaction of a want becomes a matter of mere habit and is automatically performed without receiving any special attention or concentrated interest of the whole organism, it sinks down into the realm of indifferent or even subconscious activities.

The character of the various emotions depends upon the constitution and habits of a being ; and there may be pathological pleasures as well as pains. The wants to which a creature, either by heredity or education, has become accustomed, be they natural, unnatural, artificial, or even vicious, constitute the conditions of its pleasurable emotions, and the intensity of a pleasure will be in proportion to the intensity of either the want or its gratification, or both. Pains are either wants unsatisfied or other disturbances perceived by consciousness. Growth as well as decay may produce disturbances, and both accordingly may become causes of pain.

From this standpoint all difficulties disappear. It is apparent that teething, although it is a growth, will not be a pleasure to babes. Eating is one of the commonest pleasures, because it is the satisfaction of one of the commonest needs, and its pleasures depend upon the structures of the papillæ of the tongue and other organs ; yet is eating no growth, no expenditure of energy, nor can it be identified with digestion. Digestion is the first stage in the assimilation of food ; but eating is simply chewing and swallowing ; the act of eating is not growth, not building up ; and the bitterest medicine may be more wholesome than the daintiest tidbit.

Sexual intercourse is in the same predicament ; it is the gratification of a craving that develops in the race, through the need of preserving the race ; yet is it in itself no growth ; the growth consequent upon it is gestation, and gestation is never counted among extraordinary pleasures ; it ought to be the height of human happiness in the opinion of those who identify pleasure and growth.

It is obvious that both pleasures and pains may be morbid or salutary. Every disturbance producing a reaction that will strengthen the system and increase its power, however disagreeable it may be at first, is wholesome ; while every pleasure that weakens the character must be regarded as morbid. It happens that in the life of nations and in the evolution of mankind the disturbances of great calamities prove spurs to progress. The throes that accompany the birth of a grander civilisation are often bitterly painful. Pain appears to be the condition of progress, and is frequently also its result. On the other hand, great inventions and new discoveries

in their turn, too, necessitate readjustments in the constitution of society, which are accompanied by convulsions.

When some people take pleasure in pain, when they delight in the luxury of grief and glory in their own misery, it proves only that they are possessed of a peculiar constitution. They have accustomed themselves to certain afflictions and adapt themselves to their surroundings. There are pessimists who regard sorrow as the normal and necessary condition of the world-order, and in their opinion, the emotion of world-pain agrees with the facts of life ; or, as Bouillier puts it, "best accords with the situation."

Professor Ribot rejects Bouillier's explanation and prefers that of Hamilton, who finds the principal cause of the pleasure that is felt in "the superaddition of activity which the feeling of our sufferings imparts to our whole being." This theory, however, is very artificial and appears to be devised simply to suit the hypothesis which identifies pleasure with increase of activity. Hamilton seeks for a quantitative, instead of a qualitative explanation, and expects to find it in "a too much" where we ought to consider the form of a commotion in its relation to a peculiar psychical disposition.

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Professor Ribot does not enter into the moral applications of the psychological problem ; but since they are very important, a few comments on the subject may not be out of place.

Those who identify pleasure with growth and healthy activity are apt to jump at the conclusion that pleasure is the aim of life and that the pursuit of happiness is the highest principle of ethics. They forget that pleasure is relative, since it depends upon the constitutions of people, and there is by no means an agreement about that which is and that which is not pleasurable. A glass of wine, or a smoke, may delight one man while it is an abomination to another. Therefore, to base ethics upon the pursuit of pleasure or happiness is about as unmeaning and impracticable as to base the estimate of the value of a new idea solely upon the imagination of its inventor. Standards for estimating values must be objective, and not purely subjective. Pleasure is a purely subjective state which is condi-

tioned by the systems and habits of sentient beings. Instead of making pleasure the ultimate aim and standard of ethics, the moral teacher must tell us what kind of habits will tend to build up character and add to the powers of the mind ; and thus we shall learn not to strive for pleasure in general, but only for those pleasures which would be congenial to noble-minded souls.

Feeling that Bentham's egotistic hedonism was crude and offensive, Mr. Spencer changed it into an altruistic hedonism by proposing that the greatest amount of pleasure of the greatest number is to be regarded as the aim of ethics. This may be less offensive, but it is at the same time less logical, for if pleasure remains the aim of ethics, we cannot see why a man shall, under certain circumstances, sacrifice his pleasure, the conditions of which he knows, for the pleasures of others whose needs he can only guess. Here again, as in so many other problems, the error rises by considering quantity and not quality. The worth of pleasure and its dignity depend as little upon its amount or intensity, or on the number of those who enjoy it, as the verity of a truth can be ascertained by a majority-vote.

But then, is it not nobler to aspire for the pleasure of others than for those of oneself ? Certainly, altruistic hedonism is morally higher than egotistic hedonism, but as an ethical theory both are equally wrong ; for ethics introduces a criterion for judging about the worth of actions irrespective of pleasure and pain. Otherwise the arrangement of a dancing-party would be more moral than strictness in the performance of some trifling duty.

If, after all, pleasure were to be regarded as the purpose of life, we ought to educate ourselves to such wants as are noble and elevating, such as widen the range of our soul-life, and make man greater, more powerful, and kinder. Before we make happiness the aim of life, we must let ethics so educate us that the most imperative want of our soul and our greatest delight will be the performance of our duties. In that case, however, not the sum or the amount of pleasure would have to be considered as ethical, but the kind of pleasure, which is tantamount to a surrender of the principle of hedonism that pleasure as such is a criterion of moral worth.

Professor Ribot repeats the common saying that "every animal seeks pleasure and avoids pain"; but let me add that the statement is not correct. Animals act according to their constitution which is a matter of adaptation to circumstances, natural selection, or education. The fighting-cock fights not because fighting gives him pleasure but on account of the peculiar disposition of his mind. He cannot help accepting a challenge even where defeat, wounds, and bitter pains, possibly death are the inevitable penalty; and there are men, nay, whole nations whose actions are determined not by the pleasure of actions nor by any consideration of consequent pleasures, but simply by the nature of their motor ideas. They are like powder, which ignites, not because it takes pleasure in the act, but because it is combustible. Then again there is a great number of men who deliberately seek pleasure and avoid pain, but the higher man, the moral man, the man of character, although he too finds pleasure sweet, and pain disagreeable, will, in all important decisions, not consult either his fear of pain or his desire for happiness, but act according to his conceptions of right and wrong. He will exhibit no hunger after pleasure; nor will he shun those pains that are inevitable in the pursuit of a higher and nobler life.

When hedonists define "right" as that which gives the greatest amount of pleasure to the greatest number, they are guilty of a confusion of heterogeneous ideas. By applying the same logic to another field, we might as well say that "truth" is that which seems most plausible to the greatest number of people.

Prof. Alexander Bain, who with the weight of his great authority supports the old view of pleasure and pain, says: "Inasmuch as we follow pleasure and avoid pain, if pleasure were injurious and pain wholesome, we should soon incur entire shipwreck of our vitality," but he finds it necessary to add, "as we often partially do, through certain tendencies that are exceptional to the general law." Is not one exception sufficient to upset the whole theory? And in the present case we have plenty of exceptions; for, indeed, *most* shipwrecks in life (perhaps all which are not caused by accident) occur because people follow pleasure and avoid pain. And is it not for

that reason that morals are preached? The man whose maxim is to seek pleasure and to avoid pain is sure to go to the wall.

The demands of reality are stern and care little about our sentiments. The problem of life does not centre in what we feel, but in what we do. The idea of adapting our actions to suit our sentiments is a wrong policy; for, on the contrary, we must adapt our sentiments to the needs of life, which prescribe upon the whole a pretty definite line of conduct called duty.

Man can become a higher being only when he ceases to be swayed by his feelings and becomes master of pleasure and pain. The mastery over pleasure and pain is the basis of any permanent and well-deserved success in life; it is the stamp of dignity that moral actions bear; it is the indispensable condition of a great man's greatness.

EDITOR.

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IN a former letter I offered a comparison between the classifications of character given by M. M. Bernard Pérez, Ribot, and Paulhan. To-day we have the classification of M. A. FOUILLÉE in a book entitled *Tempérament et caractère selon les individus, les sexes et les races*—an excellent work, in the perusal of which, I hasten to say, I have taken much pleasure. M. Fouillée differs from his predecessors in three points : first, he introduces the idea of evolution into the study of character ; secondly, he applies a recent physiological theory to the study of temperament ; thirdly, he finds in mind the essential factor of character, and, in a broad sense, distinguishes between character proper, which he places at the top, and moral temperament, *naturel*, which he places at the foundation.

We shall now attempt to sketch the development of his thought and indicate some of the criticisms which his system evokes.

Character, according to M. Fouillée, "is the general direction, taken by the will,—that which causes the will to react in a distinctive manner to every class of impressions, motives, and impulses." But our willed reactions repose on a primitive foundation, and that foundation—the *innermost character* of the individual—is made up of successive strata, race, sex, and lastly, the distinctive temperament of the individual. In brief, acquired character is developed upon a congenital groundwork, upon a groundwork of tendencies which express the general habitude of life of the organism, plus certain traits which express the relative value of this or that particular organ ; and this congenital groundwork entire is the *temperament*.

M. Fouillée studies temperament from the point of view of the theory of protoplasm formulated in the work of Geddes and Thomson, *The Evolution of Sex*. These physiologists, as all know, explain the elementary phenomena of life as "constructive changes (anabolism) and destructive changes (catabolism) of living matter." Now these two series of changes may combine differently, so as to produce structures and functions variously specialised in living creatures, both vegetable and animal. According to M. Fouillée, the manner and the proportion of these destructive changes in the functioning of the organism produces temperament, which, in contradistinction to what is usually called constitution, is the dynamic characteristic of the individual. If we were to pass at once to the classification of the temperaments, we should have to consider the reciprocal relations of integration and disintegration in the organism generally and in the nervous system in particular. We should have thus, saving temperaments and wasting temperaments: a *sensitive* type and an *active* type. Each of these is then again subdivided on the same principle, not only by using the dominant direction of the vital operations, but also by recourse to the intensity and rapidity with which they are accomplished. Whence result the sensitive type of prompt reaction (the lively sanguinary) or of intense reaction (nervous), the active type of prompt and intense reaction (choleric) or of a sluggish or non-intense reaction (phlegmatic).

The whole difficulty is to pass correctly from the abstract consideration of anabolic and catabolic processes to the concrete consideration of types. Now M. Fouillée, who is perhaps right as regards the principle of his theory, is here less fortunate, and when he endeavors to deduce traits of visage and of character from nutritive changes, we feel that he is guessing rather than demonstrating, and evinces more ingenuity than exactness. But it will not be difficult to absolve him; the essential thing was to have taken up the right threads of investigation.

So far, however, we have had only types of temperament. Types of character may be obtained, M. Fouillée tells us, by the introduction of the factor of intelligence. Although his predecessors

did not entirely neglect mind in their classifications, he accords to it a far more prominent rôle than they, as being the power which enables us to react and to modify the very expression of our temperament. He does not think that this factor is merely derived and secondary, or superadded,—particularly in man : he discovers a distinct germ of it in that discernment which even the lowest organisms exhibit, and without which the relations of every creature to its external environment would be impossible. The three grand psychical functions in his system are : sensation, emotion, and desire. Their reciprocal relations give us the types of character. What is really and essentially at the basis of character is the predominance, first, of sensibility, of intelligence, or of will ; and secondly, of this or that sensibility, of this or that form of intelligence. The “systematic association of tendencies” on which M. Paulhan takes his stand cannot but depend on the aforementioned relation of the primordial psychical elements, which is alone able to explain it and give body to descriptions.

M. Ribot has distinguished between *suffering* and *acting*. According to M. Fouillée these two categories apply only to temperament. Consequently, he has recourse to intelligence, and obtains three grand categories of character : the *sensitive*, the *intellectual*, and the *voluntary*. Their subdivision into classes gives us, for the first category, sensitive characters having (1) little intelligence and little will, (2) voluntary energy but little intelligence, (3) little will but much intelligence ; for the second category, intellectual characters, we get (1) the exclusively intellectual type, and (2) the intellectual type with lively sensibility ; for the third category, we get voluntary characters having (1) little sensibility and little intelligence (obstinate, opinionated), (2) much sensibility and little intelligence (passionate, violent), (3) much intelligence and little sensibility (cold, energetic characters, a Turenne, a Von Moltke). Classifying them in respect of intellectual objects, we should have egoists and altruists.

M. Fouillée is no doubt right in saying that the germs of intelligence are met with in the first stages of life. Where there is life there is consciousness, memory, and discernment. But when we

speak of intelligence, we understand rather faculties dependent on higher nervous centres, states of reflexion and of full consciousness. Now these states float, so to speak, only on the surface of our mental life. The direction of our will, therefore, does not wholly belong to our intelligence; nor does our soul know of its impulses, nor our conscience contain the sum of all our physiological tendencies. It follows that the three categories of classification proposed by M. Fouillée form a scale and lie one upon another rather than take their places upon the same plane. He admits, even, that classes (1) and (2) of sensitive characters are nearer to the animal life, but I do not see in what respect they are different from the sensitive and active types of M. Ribot. The last-mentioned psychologist appears to me to observe better the principles of good classification, the chief device of which is the subordination of the marks considered.

On the other hand, M. Fouillée recognises that our "sentiments" direct our will, and he also declares that "every sentiment is a state both of intelligence and sensibility." But who is going to deny that our sentiments depend mainly on our sensibility? And if, finally, our "voluntary reaction" is necessarily related to the impressions which provoke it, how can it be denied that our temperament renders us subject to this or that impression, and furnishes our will, so to speak, with its first subject-matter? No, the gap between temperament and character is not so profound as M. Fouillée declares. I must commend his emphasis of the rôle of mind, which is apt to be neglected by modern psychology; but he is wrong in forgetting that the "psychical functions," which are indistinct at the beginning of animal life, never sever their mutual connexions in higher creatures.

It will be impossible for me to discuss the two parts of his book which are devoted to sex and races. He shows himself here the judicious thinker whom our readers have learned to prize, and if there are questions which he does not solve, he has at least the merit of having subjected them to careful scrutiny. Many writers who style themselves philosophers pay no attention to them.

M. G. DE GREEF in *Le transformisme social* gives us, as the subtitle of his work says, "an essay on the progress and regress of societies." In the first part he sets forth in order the beliefs and doctrines relative to the idea of progress and decay; and, imperfect as this rapid review of the philosophies of history is, it can nevertheless be read with interest. In the second part he discusses the facts of retrogression and advancement, and endeavors to extract therefrom their laws. I should not like to say that he has reached exceptionally precise conclusions. His formulæ, whether they deal with commonplace truths or mooted questions, are clothed in a heavy and abstract phraseology.

M. de Greef raises courageously, and that is his strongest point, many important questions—for example, that of the measure of civilisation, or of the characters which enable us to form an estimate of the state of progress or retrogression of a given society. Inspired by the biological conception, he finds progress in the "degree of organisation" of the social body. M. Tarde, on the contrary, will have nothing to do with social organisms, and believes he can classify societies according to the highness of their ideal, and not according to the division or cohesion of their work in respect of that ideal. According to M. Tarde, a social type, an ideal of society, is more perfect the larger the number of divergent "beliefs" and "desires" it harmonises and consolidates, with the result that the agreements of opinions and interests proportionately outweigh the disagreements. But this harmony of beliefs and desires is not revealed, and can only be grasped in the facts; and are not these facts social data of all orders, economical, juridical, religious, etc.? The psychological method lauded by M. Tarde is forced to have recourse in the opposed method which M. de Greef practises. The one party says: "There can be no harvest where man has not sown; it is man who is the maker of his own history." The others say: "The harvest is something in itself, and the methods of operation are not indifferent. What is psychological is the individual; what is social is the collective labor." However that may be, human activity can only be judged by the results which it yields, and these results are

social events, events which have a particular value and are capable of being compared.

Sociologists of the stripe of M. de Greef and M. Durkheim are in danger of invoking mysterious laws or sociological agents,—mere useless entities. Sociologists after the fashion of M. Tarde incur the risk of treating history as a disordered and confused mass of phenomena whose relations are without interest and whose study is without profit. The controversy is far from being ended between the two parties, and occasion will offer itself again for criticism of their curious discussions.

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M. GUSTAVE LE BON gives us, in his *Psychologie des foules*, an interesting work. The growing importance of crowds and assemblies, under the form of public opinion and collective sentiments of all kinds, is beyond doubt one of the striking traits of modern life; they are becoming here a singular factor, which we must endeavor to comprehend. M. Le Bon studies in this volume more especially the crowds and assemblies which he terms *heterogeneous*, whether unnamed (crowds of the streets, etc.) or named (juries, parliamentary bodies, etc.). He intends to take up later the study of homogeneous crowds (sects, castes, and classes).

The distinguishing characteristics of crowds which it is essential to remember are the following: (1) the unconscious elements which are present in individuals and through which they resemble one another are liberated by the contact of the individuals in the crowd; (2) every superior individual loses in crowds a portion of his intellectual ascendancy, the mental level is equalised and lowered; (3) crowds act from sentiment and not from reason; (4) they are fickle for the reason that they are receptive or subject to suggestions and lack all power of criticism; (5) they lapse perforce under the leadership of a chief, a vulgar leader, or a man of conviction and strong will-power. Of all these characteristics, which are already more or less well known, the two first seem to me to deserve most attention, and M. Le Bon has not wholly exhausted their contents. His mode of exposition, moreover, is not without its faults. He does not distinguish clearly between what is individual and what

is characteristic of the crowd. He tells us, for example, that the Parisian public was much less startled by the epidemic of influenza which carried off five thousand persons in a few weeks, than it would have been by the fall of the Eiffel Tower, which would have crushed, say only five hundred persons. The reason of this difference is entirely in the individual and in the nature of the event. A man who has reached the age of fifty years has seen, let us say, twenty persons die, relatives and friends. If he had lost them all in one day or in one year, the impression felt would clearly have been different, more voluminous I might say, and that on grounds which are not at all concerned with the psychology of masses. How, moreover, can M. Le Bon assert that the Homeric poems are praised in sheer deference to fashion, but that in reality their perusal is an insufferable bore to every modern reader. I humbly confess that I enjoy these poems more than I do most contemporary novels. But let us leave this little difference and look at the work of our author in its practical and theoretical significance.

M. Le Bon in his enthusiasm for his subject is on the verge of seeking in the psychology of crowds the key to history, which M. Tarde finds in imitation. There are numerous other keys, and together they make a pretty ring. The truth is, that social phenomena are so complex that there is profit in considering them from several points of view. We then catch gleams of details and even of broader features which escape the eye on a glance at the whole. If the psychology of crowds explains many things, on the other hand it teaches us nothing regarding the reason of their succession; it reveals one of the mechanisms of human history rather than its laws, and as a matter of fact M. Le Bon stops at race as an indecipherable factor, a mysterious enigma. He is sensible that psychological theories are never more than an end of the thread of Ariadne and that we do not possess the plan of the mythological labyrinth.

As to the practical conclusions which he draws from his studies, some are eminently discreet, but there are others which it is more difficult to justify. In some cases he sees things from one side only; often he simplifies problems too much in solving them.

The elasticity of the notion of race does not allow of the rigid deductions to which it sometimes leads him. M. Le Bon finally, lays much stress on the elusive and unreal character of the ideas which have led the world ; but he should inquire whether these illusions have not some solid basis. Human happenings alone cannot be considered devoid of meaning in the totality of natural phenomena where on all hands we find order and regularity.

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M. Le Bon has observed in the book which I have just noticed that if socialism is so powerful to-day it is because it is the only illusion which is still alive. Despite all scientific demonstrations, he says, it continues to grow. The crowd turns from proofs which are disagreeable to it and prefers to deify error, if error is attractive. The Preface of the book of M. R. GAROFALO, *La superstition socialiste*, admirably illustrates the foregoing observation, as the reader will remark on perusing the imaginary conversation with the Marxian fanatics. Unfortunately the work of the eminent Italian magistrate is, by the very force of the illusion inherent in the sophisms which he combats, in danger of remaining unfruitful as many other learned works have done. M. Garofalo, it is true, addresses his arguments principally to persons in the middle and higher classes, who imagine that socialism stands for truth and progress. The danger is a real one which comes from the support which the socialists' doctrines have drawn from the authoritative ranks of society. There are reasons why socialism is growing, but it is not an organising power : it is in the eyes of the philosopher one of those forms under which the active dissolution of our social systems disappears. The remedy will be found not in refutations of the socialistic error, but in the correction of the conditions which give rise to it and render it desirable.

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M. PAUL BOILEY in *Les trois socialismes—anarchisme, collectivisme, reformisme*, offers a criticism in this last direction. I could not discuss his book here without going outside the limits of our studies and shall confine myself to recommending its perusal to the reader. A second French edition of the great work of M. C. LOM-

BROSO, *L'homme criminel* has just appeared. It has been considerably enlarged and will find a place in all libraries. Both the second volume and the atlas are completely new. The additions embrace interesting monographs on the criminal from passion, the criminaloid, and the insane criminal, original studies on fetishism in love, etc.

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M. HYACINTHE LOYSON (Père Hyacinthe) publishes two simple lectures delivered in Paris under the title of *France et Algérie, Christianisme et Islamisme*.¹ He studies here first, the law, and secondly, the religion of Islam. His practical conclusions have special importance regarding the relations of France to its Musselman subjects. His theoretical conclusions will be of more interest to American readers. M. Loyson, who is a sincere Christian, declares the inferiority of Islam as compared with Christianity, but he does it with full justice, and strives to emphasise the bonds which unite the religion of Jesus with that of Mohammed, endeavoring to join the souls of their adherents in one single truth. I think, and have remarked it elsewhere, that the inferiority of Islam is mainly that of the races to which it is addressed. Christianity has had the benefit of the rich heritage of Greece and Rome without which it would never have attained its high destinies. No one will deny that there are several Christianities, and it cannot be affirmed of them that they are always and everywhere superior to Islam.

M. Loyson could not treat, much less exhaust, such questions in these simple lectures. But the sincere effort which he makes towards the reconciliation of souls and of races is an act marking an epoch and will not fail of its results: the service of the eloquent preacher will be remembered in the future by all serious men.

LUCIEN ARRÉAT.

PARIS.

¹ Dentu, publisher. The other works mentioned are published by Félix Alcan.

BOOK REVIEWS.

DIE SCHÖPFUNG DES MENSCHEN UND SEINER IDEALE. Ein Versuch zur Versöhnung zwischen Religion und Wissenschaft. By Dr. Wilhelm Haacke. With sixty-two illustrations. Jena: Hermann Costenoble. 1895. Pages, 487.

Dr. Wilhelm Haacke of Jena, the author of *Die Schöpfung der Thierwelt*, and various other books and essays on similar subjects, has published a new work "The Creation of Man and His Ideals," which he calls in a sub-title "an attempt at a reconciliation between religion and science." We hail the book as a symptom of the times, for it proves that naturalists are beginning to awaken to the importance of the religious problem. Theologians have attempted, in their way, to reconcile science with religion, and have failed. They have aspired to defend their dogmas on the ground of distorted views of natural science. A philosophical solution has been propounded by Herbert Spencer, who, claiming that first principles are unknowable, divides the world into two domains: one, the knowable, for science to investigate; and the other, the unknowable, the haunt of metaphysics, superstitions, and religion. The solution of agnosticism helps religion as little as it does science, for while the main truths of religion are declared to be inaccessible to our comprehension, science is at the same time burdened with the doctrine that the most important facts of life, such as the human soul and the problem of the nature, the existence or non-existence of God, are insolvable riddles. Should not a man trained in the school of natural science be more successful in solving the problem?

Professor Haeckel ventured to propound his monism as the bond between science and religion. But it seems to us, as we stated in a review of his booklet published in *The Open Court*, that he misunderstood the religious import of religious ideas. He failed to understand that religious life belongs to the sphere of psychological, sociological, ethnical, and ethical manifestations, and cannot be regarded merely as an aspect of physics. The idea of God is a concept of moral import, and when Haeckel identifies God with energy and matter (*Kraft und Stoff*) he misses the essential characteristic of God and also of the significance which the idea of God possesses in both the history of mankind and in the life of every single God-believer. Further, when Professor Haeckel identifies the immortality of the soul with the indestructibility of matter and energy, he overlooks the fact that the

aspirations of man, which constitute his soul, are not material things, and the preservation of the atoms of which at the time of death a man's body is constituted has nothing to do with the continuance of his ideas and ideals.

Dr. Haacke's book is quite voluminous, but we regret to say that the bulk of it has nothing to do with the problem to which it is devoted. It is rather a review of the various evolution theories measured by the author's own opinion on the subject, while only a few chapters, and especially the superadded part (*Ergänzungstheil*, p. 429), are devoted, to some extent, to the problem of the reconciliation of religion with science.

The introduction declares that the book aims "to propound a world-conception based upon the evidence of the oneness of the organic and inorganic natural processes, conceiving religious, artistic, and scientific aspirations in their fundamental unity"; but in spite of this unity of religion, science, and art, the author warns us at once (page 5) not to mix up the domains of knowledge and belief. Yet, if the theologian imagines that this will prove a protection to his dogmas, he is mistaken, for in the first part of the book, which treats of the evidences of the origin of man, Dr. Haacke denies a separate creation, and declares him to have developed from lower ancestors.

In the second part of the book the author reaches his favorite topic; for here he criticises the various evolution theories,—preformation and new-creation, evolution and epigenesis, transformism and creatism. Haacke rejects Darwinism, that is, the doctrine of natural selection, and also its extreme, Weismannism, the theory of germinal selection. The theories of Nägeli, Herbert Spencer, and Eimer are slightly touched upon. Then the methods and results of natural science are briefly surveyed; the import of physiology, the doctrine of the economy of organisms, animal psychology, palæontology, and animal geography are outlined, and the *résumé* is measured by facts. The most important fact, according to Haacke, is the aspiration of organisms to restore the disturbed equilibrium (*Streben nach Wiederherstellung gestörten Gleichgewichts*) which produces their higher and higher consolidation (*Gefügestärke*). This fact, the statement of which is practically the gist of Dr. Haacke's own theory of evolution, is said to be unknown to the Neo-Preformists.

The third part discusses the growth of the various forms of both the inorganic and organic domains. After explaining the nature of crystals and plants, Dr. Haacke speaks of the evolution of animal organisms. "Person" is defined as "an animal form consisting of various layers of cells and in possession of a stomach." There are two kinds of persons: persons without *personelles*, and persons that are in possession of *personelles*, that is to say, such as possess two or more parts which are of equal value. Persons that are in possession of *personelles* are actinozoans, worms, mollusks, crustacea, articulates, and vertebrates. Man is said to consist of two *personelles*, both of which possess the same organs (p. 197). After a review of the persons with a fluctuating or a constant number of *personelles*, with symmetri-

cal and unsymmetrical personelles, etc., etc., Haacke recurs to his law of the organic equilibrium, which serves as a key to all evolutionary problems. In reviewing the older doctrines of creation, Dr. Haacke claims Goethe on account of his *Bildungstrieb* and Karl Ernst von Baer on account of his *Zielstrebigkeit* (page 257), that is to say, an endeavor to attain ends which dominates the entire domain of organised life, as forerunners of his own theory.

The origin of the human form, and of the ancestors of man is the subject of the fourth part. Haacke regards the problem of the unity of mankind as an open question, and he offers on page 314 as a *résumé* a hypothetical sketch of the development of the mammal as an illustration of the way in which the problem of the origin of mankind should be treated.

Next in order is the problem of the creation of the soul to which the fifth part is devoted. Haacke accepts the parallelism of psychical and mechanical processes, but denies that we know anything about the connexion between the two. Sentientcy and will are inseparable. Wherever sentientcy obtains, there will is. Memory is said to originate through an equilibration of the various sense-organisations which by mutual interaction produce definite parts of transmission. Haacke declares that every atom must in every definite constellation at a given moment possess a definite sensation and a definite will. In addition, the primitive atom is said to be possessed of memory (p. 339). The higher combinations of the primitive atoms, viz., the atoms of the chemical elements, of the chemical molecules, of gemmaria, and of cells, form the degrees of individualisation of memory. On the basis that the primitive atom (whatever that may be) is already endowed with memory (which, in the reviewer's opinion, is a bold and untenable assumption), Haacke builds his theory of the origin of a hereditary memory, and discusses the various instincts, such as nutrition, copulation, locomotion, nest-building.

The fifth part concludes with an investigation of the nature and origin of human ideals, which have developed gradually and in the same way "as the animal soul is produced by a co-operation of its single constituents of which the ultimate particles are the primitive atoms of matter." The definition of an ideal is (on pages 376-581) given in illustrations. The ideal of a crystal is said to be that which is "as characteristic as possible of its kind" (p. 377). We attain the notion of ideals by forming a spiritual image of all crystals of a special kind with which we are acquainted, after an exclusion of all foreign elements and of all their defects. Ideal, accordingly, is "a combination produced by a process of completion which satisfies our innate demand of unification" (p. 379). The formation of our ideals corresponds to material processes in our brain. Supposing we have formed an ideal of a certain thing, we must assume that certain particles of our brain have accordingly assumed a characteristic arrangement. Thus we are again confronted with the law of an aspiration toward an inner equilibrium which here is of a spiritual nature (p. 380). Having given an explanation of the ideal, Haacke discusses the ideals of beauty, morality, and truth, and coming now at last to the problem of

the origin of religion, which again is explained as due to an aspiration toward equilibrium, and is defined as "the belief in a moral world-order," Haacke says: "He who does not possess this belief has no religion."

The belief in God originates through the necessity of our being obliged to establish an equilibrium of our spiritual life with the surrounding world (p. 391). Polytheism is reduced by civilised man to monotheism by reducing the many causes to the one single cause of the world. This single cause to the civilised man is God, the God of truth, goodness, and beauty. Haacke adds: "It is God himself who 'reveals himself to us, for God is nothing more nor less than this aspiration 'towards a spiritual equilibrium. The naturalist who investigates the ultimate "secrets of the world, and the artist who realises the highest ideal in his creative "imagination, will both find God in the same way as did the Saviour, whose moral "greatness permitted him to call himself 'the Son of God.' Never a truer word "has been spoken than by Goethe when he said: 'He who possesses science and "art has also religion,' and the origin of religion lies deeply founded in existence" (p. 392).

The sixth part is a cursory treatment of the origin of language, which, however, barely touches the problem.

The seventh part discusses the importance of the doctrine of equilibrium for practical life, in art, science, and religion. Haacke declares that "only such a "religion as allows us to bring our ideals into mutual equilibrium can satisfy our "demands. If we are right, that the activity of the brain consists in the attainment of equilibrium, and if we can have a feeling of satisfaction only on the condition of, at least to a certain degree, attaining this aim, all those beliefs must be "rejected which prevent us from attaining a psychical equilibrium" (p. 470). In order to preserve the equilibrium, a religious teacher must, according to circumstances, surrender or modify his dogmas. He should not admit rigid doctrines which allow of no adaptation, and the adherence to immutable credos "may even become directly irreligious" (p. 480).

Under the same heading are treated the principles of nationality and cosmopolitanism, of socialism and individualism, of morality and law, of education and instruction, and national hygiene.

The most important portion of the book is the *Ergänzungstheil*, the complementary part, a kind of *résumé* of the philosophical principles that underlie Haacke's world-conception. Here he explains his view of the nature of cognition. "The "data of cognition are the various sensations, colors, sounds, odors, tastes, the "touch of resistance and of temperature, and also the combinations of all these "things in time and space. These things are the elements from which our cognition grows. Our perception of them forms the elements of our cognition. Cognition consists in our conviction of the necessity of the coincidence of two or "several events, and our knowledge of this necessary coincidence is as much a "matter of immediate certainty as our knowledge of the existence of sensations; it

"is of an immediate nature and consists simply in the feeling of satisfaction. A consideration of the combination of the elementary sensation-complexes leads to the distinction of extra-sensorial and intra-sensorial processes. The intra-sensorial processes constitute our ego, and thus our ego is the totality of all the things we know. Our ego is identical with our world. My world is my ego. It is the complex of all cognition elements, concerning the existence of which I possess an immediate certainty. When investigating the world I naturally investigate my ego. When amplifying my cognitions, I amplify my ego. When increasing my knowledge of the world I increase my ego" (p. 438).

Haacke then propounds the question, whether we are justified in considering the molecular complexes of which the extra-sensorial world may be supposed to consist as sensoriums of other egos, and he says: "In order to answer this question a discussion is necessary concerning the connexion of all things. But of such a connexion in the knowable and conceivable world we know nothing at all. It can, in case it exists, only belong to the world which lies beyond limits of natural cognition. Does such a beyond exist, a transcendental world, a metaphysis?"

Haacke is not prepared to deny the question. On the contrary, he believes that he who denies the existence of the transcendental world of a metaphysis would have to deny the existence of sentiency in his neighbors. The pains and pleasures of other people and the manifestations of their will would be non-existent. He declares that the problem of the existence of a metaphysis does not concern the naturalist. It is a matter of the speculative philosopher, and he, too, is unable to make any definite statements. For, "how can one describe something that is inaccessible to cognition" (p. 443). The realm of metaphysis lies as its name indicates, beyond the limits of natural cognition, "What I can represent in thought does not belong to the domain of metaphysis" (p. 446).

In all these expositions Dr. Haacke shows, in our opinion, a decided lack of knowledge as to the nature of the metaphysical problem, and his own statements are by no means free from contradictions; for a closer study of the nature of the metaphysis will either reveal to him that metaphysis is the psychical correlative of bodily appearance, and as such it is by no means unrepresentable in thought, or, it means some superadded unknowable cause of the real facts of nature, both psychical and physical, and in that case it is a redundant assumption which will avail nothing in the explanation of the world.²

The essence of Professor Haacke's book is summed up in the concluding remarks of the *Ergänzungstheil* on pages 459-461, and as they contain in pregnant form all the points on which we disagree from Dr. Haacke, we deem it best to translate the whole passage which is headed "The Possibility of a Teleological World-Conception," and reads as follows:

¹An exhaustive discussion of the problem, in which our own standpoint is set forth, has been published in *The Monist*, Vol. V., No. 4, under the title of "The Metaphysical x in Cognition."

"Teleological is the world-conception which claims that the world-process has a purpose. We have to declare explicitly that a naturalist has nothing to do with teleology or the doctrine of purpose, for the question of the existence or non-existence of a world-purpose is absolutely unanswerable, since it concerns the metaphysics. Natural science can regard the mechanistic world-conception alone as admissible. Thus a naturalist has nothing whatever to do with the question [mentioned on page 184 of Haacke's book] whether a transformation of the blossoms of *Campanula glomerata* in which the three carpels are sometimes replaced by two is teleological or not. He has to deal with the causes only of this transformation. When entering upon the question concerning their purpose or lack of purpose, he would foolishly venture beyond the limits of natural cognition into the realm of the metaphysics, and within the domain of his science any investigation of the metaphysics is forbidden.

"It is strange that Darwinism is constantly praised as the highest wisdom of the mechanistic world-conception and the highest triumph of natural science, while it should have been denounced long ago for tasting of the fruits of the tree of metaphysical cognition forbidden to natural science because absolutely impossible. Darwinism maintains that the world has no purpose for Darwinism is the doctrine of selection,—the doctrine of a selection of that which is accidentally favored. The doctrine of the survival of that which happens to be the fittest. But by maintaining that the world has no purpose, Darwinism blindly enters the domain of the metaphysics which is forever closed to science. In Darwin, who by propounding his theory of natural selection unknowingly overstepped the limits of natural cognition, the abhorrence of the Anglo-saxon to all so-called 'abstruse' investigations found its punishment. Had he busied himself more with 'abstruse' things, he might have recognised that his theory which for the sake of being entitled to existence must deny a world-purpose and thus become metaphysics ventured upon the 'abstrusest' of all domains, upon the domain of metaphysics. And most of the naturalists of the 'nation of thinkers' followed him upon this domain with noisy drums in a jubilant parade and began to propound theories which in their blindness they called anti-metaphysical. However, one of them might illustrate even to the most shortsighted, that their theories are actually metaphysical, I mean the author of the pamphlet on the 'Omnipotence of Natural Selection.'

"But though the naturalist must keep his science clear of metaphysical considerations, he, as an aspiring man is allowed to overstep the limits of natural science so as to propound for his own person the question whether the world has a purpose and whether, accordingly, human existence is worth living. Darwin certainly would have been entitled for his own person to deny a world-purpose, for that is a problem which he has to settle with himself and with his God alone, (supposing that he had a God,) which, however, does not concern natural science, for natural science is and must remain mechanistic. Natural science is allowed

"to become metaphysical only in so far as she propounds the mechanism as a "world-principle. However, as Darwin was allowed to propound privately for himself an anti-teleological metaphysics, every one else is allowed privately to establish a teleological metaphysics.

"We have the choice between a wild chaos and an orderly purpose-regulated 'cosmos, and I believe that he is mistaken who trusts that the choice of most people will be the chaos.

"However that may be, the world-conception here developed gives to science 'what belongs to science and leaves everybody at liberty to give to God what belongs to God."

In reply to this sample of Dr. Haacke's metaphysics, we have to make three remarks. First, on the meaning and scientific import of the word *teleology*. Secondly, on the corollaries of Darwinism which Haacke imputes to Darwin and to the Darwinists, and lastly, on the relation of the God-idea to metaphysics.

Teleology is derived from a Greek word, *telos*, which means "aim, goal, end, or purpose." The question whether the world has a *telos* or not lies by no means beyond the limits of science; firstly because there are no limits to science, for science investigates everything that comes within the ken of the human mind and grapples with every problem that in the course of our mental evolution presents itself. If there is a problem that is *per se* insolvable, we may rest assured that the problem is illegitimate, that is to say, it is wrongly formulated. Secondly, to say that natural science should investigate the causes alone and not the ends or aims or purposes of natural events, is about the same as to declare that we must fix the direction whence a bullet comes but should not ask whither it flies. The solution of the "whence" settles the "whither." The two questions concerning the causes and the ends of motions are inseparable. We cannot investigate the former without gaining an insight into the latter. Thus to investigate the existence or non-existence of a world-purpose is not only not forbidden to natural science but is its main duty. If natural science has nothing to say on this main problem of all problems, we had better give up natural science and resign all attempts at investigating nature.

The confusion by which Dr. Haacke is bewildered, originates, here as in so many other questions, in the misconception of what is meant by *cause*. The word *cause* is sometimes used in its legitimate sense as "that event which through a transformation of circumstances produces a new state of things called the effect." And then again it is used in the sense of *raison d'être*, ground or reason. Whenever we know the *raison d'être* of an event, we know its end, or aim, or purpose. If we are familiar with the nature of gravity we know that the stone tends toward the centre of the earth, that is to say, the centre of the earth is the aim of the stone. If we are familiar with the motives of a man, which in their totality we call his character, we know the aims or purposes of his actions.

The Greek word *telos* means both "aim" and "purpose," and in modern lan-

guages we distinguish between an aim that is unconsciously pursued, as the aim of a falling stone, and an aim that is consciously pursued as the end in view of an intelligent creature. The problem of the world-purpose is by no means as Haacke assumes, insolvable. The theory of evolution is an unmistakable answer to the question of the aim of the world-process, of the law that regulates the main tendencies of all motions and aspirations. Certainly the world-process, that is to say, animated life such as it appears upon earth, does not at its very beginning pursue a purpose, and its aim is not planned by a mind in the fashion of human purposes, but there can be no question about it that the evolution of life pursues a definite direction, the recognition of which is the most important problem of the science of life in its broadest aspect.

Darwinism, as the word is used by Dr. Haacke, is a man of straw whom he can thrash at pleasure. For who, or what is this Darwinism? But Dr. Haacke should remember that the thrashing of straw is a pretty useless performance. If Darwinism means the doctrine of Darwinists, Dr. Haacke should consider that there are Darwinists who believe that the world has no purpose, and there are other Darwinists who believe that the world has a purpose. If he wishes to criticise the former, he had better have quoted the very words of those Darwinists whom he intended to criticise, for it seems to us that it would be very difficult to find Darwinists who accept the conclusions which Dr. Haacke imputes to them. If, however, by Darwinism is meant the doctrine of Darwin himself, it appears to the reviewer that Dr. Haacke is extremely unjust to the great naturalist. Indeed Dr. Haacke's book is full of the most unfair accusations of Darwin, which would be very difficult for him to prove. Any one who has read Darwin knows that no naturalist was so careful to avoid metaphysical speculations and to confine himself to the mere statement of facts. If Haacke intends to criticise Darwin's metaphysicism, he should first state Darwin's propositions impartially and not with additions. Darwin never spoke of the survival of those that happen to be the fittest, but to use the current phrase, simply of the survival of the fittest. Dr. Haacke's criticism applies merely to that which he imputed to Darwin, not to that which Darwin said himself.

Dr. Haacke's reconciliation between religion and science consists in a bi-partition of the world, one half of which is surrendered to science, and the other to God. Thus, God is relegated to a realm inaccessible to science which naturally must stamp upon atheism the imprint of a scientific justification, and science is contrasted to God in such a way as to justify that hatred of science which is so common among fanatics and bigots who denounce science as ungodly and irreligious, because they anticipate from it the destruction of their irrational credos and other dear prejudices. How little tenable Dr. Haacke's proposition is may be learned from the fact that on page 392 he himself, in contradiction to his own principles of excluding metaphysics from the domain of the knowable, defines God as "man's aspiration toward a spiritual equilibrium." Thus, God is to him neither unknowable nor metaphysical, nor transcendental; God is, according to Haacke's own definition, the very kernel of

man's moral being and the most important part of his soul. The nature of God, accordingly, would not be a mere private affair concerning which no one has a right to propound an opinion except quite privately for himself alone; but it would be the most important problem of life, the discussion of which could not and should not be avoided in the most important sciences, which are ethics, psychology, sociology, and also political economy. And this paramount importance of the religious problem, is the position which we have always maintained in all our publications,—in *The Open Court*, in *The Monist*, and in the books that have been brought out by The Open Court Publishing Company.

So long as a man's notion of God is simply an external acceptance of the traditional image of the Deity as it is represented in the symbolical books of the Church, he cannot distinguish between the essential and unessential, between the truth and the allegorical form in which the truth is represented. The existence of such a God cannot be demonstrated, he has simply to be postulated (to use the slang of Kantian philosophy). But after all, what a poor God is the God that must be postulated! For it matters little whether or not a being or a thing exists that lies without the pale of all possible experience.

How radical is the change as soon as we attempt to reduce our notion of God to terms of our life-experiences. Instead of starting with a postulate that never can be proved, we investigate facts and discern between the eternal and the transient; the immutable or everlasting, and the perishable or ever changing; the universal and the particular. The former is the divine, the latter characterises the phenomenal of the creation. The divine, as the law of being, becomes to sentient and aspiring creatures the norm of conduct, for it enforces obedience on penalty of perdition and constitutes the ultimate authority of morality. This is what we call the superpersonal God of the Religion of Science. Whether or not we choose to call this omnipresent reality "God," it is here in us as the most essential part of our experiences and it is also traceable in the world that surrounds us. It is immanent in the universe as the cosmic order of nature, and it is, at the same time, supernatural as the condition of any possible kind of world, for indeed we may imagine that other worlds consisting of some other material existed besides this actual world of ours, but it is impossible that there be any world in which the universal laws (such as are formulated in logic, arithmetic, and the other formal sciences) would have no application.

While we propose a solution of the religious problem that widely differs from the conciliation between religion and science as offered by Dr. Haacke, we heartily recommend his book to a friendly, albeit, at the same time, a critical perusal. P.C.

FRIEDRICH NIETZSCHE, ein Kämpfer gegen seine Zeit. By Dr. Rudolf Steiner.
Weimar: Emil Felber. 1895. Pages, 125.

It is probable that Friedrich Nietzsche, in spite of his erratic and almost insane views, will come to the front in Germany and perhaps even in our country. The

school-philosophy at the various universities of the civilised world has become so self-satisfied and at the same time so barren that a revolution arising from the depths of the instinctive life of the people may be anticipated. Such a philosophy of revolution found an ingenious prophet in Friedrich Nietzsche, a man full of eccentricities, a hater of sound logic, a writer of incoherent thoughts, yet always interesting in his Corybantic frenzy, proud and full of contempt for professional philosophers whom he characterises as personified text-books on logic. However much we sympathise with the aspirations of an original thinker who wants to regenerate the sickly thought of his age, and however much we recommend the study of his ebullitions which are ingenious and amusing at the same time, we cannot prophesy for Nietzsche a lasting success, for his philosophy is self-destructive; it is a philosophy that repudiates clearness of thought and as such it is in itself impossible. In spite of his many affirmations Nietzsche is negative, for all his affirmations are a vigorous protest against the suppression of the various instincts of thought, including those which are illegitimate, because they would not submit to logic, truth, and morality. If Nietzsche really were victorious it would mean an intellectual disintegration of philosophy, science, and ethics.

Dr. Rudolf Steiner is a man who feels an intellectual kinship to Nietzsche. What Nietzsche said concerning Schopenhauer, Steiner applies to his own relation to Nietzsche. He says: "I belong to those readers of Nietzsche who, having read his first page, know for certain that they will read all the remaining pages and will listen to every word uttered by him. My confidence was at once established. I comprehended him as if he had written especially for me." The present booklet contains an almost complete characterisation of Nietzsche, with the exception of his biography, which ought not to have been omitted, especially as his sad death in a state of alienation is quite in harmony with his philosophy of life. We may add that Macmillan & Co. are going to publish a translation of Nietzsche's complete works.

Nietzsche is the philosopher of instinct. He spurns all logical order, even truth itself. He has a contempt for every one who learns from others, for he regards them as slaves to other people's thought. He says in his motto to the second edition of his "Gay Science":

"Ich wohne in meinem eignen Haus,
Hab' niemandem nie nichts nachgemacht
Und—lachte noch jeden Meister aus,
Der nicht sich selber ausgelacht."

"I live in my own house, have never imitated anybody, and ever laughed at every master, who does not laugh at himself."

We wonder that Nietzsche did not think of Goethe's little rhyme, which seems to suit his case exactly:

"A fellow says: 'I own no school or college;
No master lives whom I acknowledge;

And pray don't entertain the thought
That from the dead I e'er learnt aught

This, if I rightly understand,
Means : 'I'm a fool by own command.'

Nietzsche is an individualist who observes that the thoughts of most philosophers are secretly guided by instincts. He feels that all thought is at bottom a "will for power." The will for truth has no right to exist except it serve the will for power. He reproaches philosophers for glorifying truth. When Fichte in his *Duties of the Scholar* says : "My life and my fate are nothing ; but the results of my life, are of great importance. I am a priest of Truth ; I am in the service of Truth ; I feel under obligation to do, to risk, and to suffer anything for Truth," Nietzsche declares that this is shallow. Will for truth, he says, should be called 'will to make being thinkable.' Here, it seems to us, Nietzsche simply replaces the word "truth" by its definition. For what is truth but a systematic representation of reality, a comprehensive description of facts ; truth is "being made thinkable." Nietzsche is perfectly right when he says that truth in itself is nothing, for every representation of reality must serve a purpose, otherwise it is superfluous and useless. And the purpose of truth is the furtherance of life. Nietzsche instinctively hits the right thing in saying that at the bottom of philosophy there is the will for power. In spite of our school-philosophers' vain declamations of "science for its own sake," genuine philosophy will never be anything else than a method for the acquisition of power. But this method is truth. Since the scholars' specialised business is the elucidation of the method, not its purpose, not its application in practical life, Fichte's ideal of the aim of scholarship remains justified.

The will for power, in order to succeed, must be clarified. The contradictory impulses must be systematised so that they would not mutually annihilate themselves ; and the comprehension of this orderly disposition is called reason.

However ingenious the idea of a super-man, as pronounced by Nietzsche, may be, and however cleverly the new word is coined, Nietzsche carries his propositions to such extremes that in spite of many flashes of truth they become in the end ridiculous and even absurd. Nietzsche is on the right track when he ridicules such ideals as "virtue for the sake of virtue," and even "truth for the sake of truth." Virtue and truth are for the sake of life. They have not their purpose in themselves but their nature consists in serving the expanse and further growth of the human soul. This is a truth which we have always insisted upon and which becomes apparent when those people who speak of virtue for its own sake try to define virtue, or determine the ultimate standard of right and wrong, of goodness and badness. We say, that that which enhances soul-growth, thus producing higher life and begetting the super-man is good ; while that which cripples or retards those aspirations is bad. Further, truth is not holy in itself. It becomes holy in the measure that it serves man's holiest aspirations. We sometimes meet among scientists, and especially among philologists, men who with the ideal of "truth for the

sake of truth " pursue some trivial investigations. They resemble Wagner, whom Faust characterises as :

" . . . a fool whose choice is
To stick in shallow trash for ever more,
Who digs with eager hand for buried ore,
And when he finds an earthworm he rejoices."

Thus there are many trivial truths which are indifferent and the investigation of which is of no account. For instance, whether the correct pronunciation of the Greek letter η was *ee* or *ay* need not concern us much, and the philologist who devotes to its settlement all his life and his best strength is rather to be pitied than admired. Various truths are very different in value, for life and truth become holy according to their importance. This all granted, we need not, however, discard truth, reason, virtue and all moral aspirations as does Nietzsche, who in his *super-man* says : " What is the greatest that you can experience ? It is the hour of the great contempt, the hour in which you become disgusted with your happiness and at the same time with your reason and your virtue."

Nietzsche apparently is under the illusion that reason, systematic thought, the moral discipline, self-control, are external powers, and in his love of liberty he objects to their authority. Did he ever consider that thought is not an external agent, but a clarification of man's instincts, and that discipline is, or at least in its purpose and final aim ought to be, self-regulation, so that our contradictory thoughts would not wage an internecine war. Thus Nietzsche, the instinct philosopher, appears as an ingenious boy whose very immaturity is regarded by himself as the highest blossom of his existence. Like an intoxicated youth, he revels in his irresponsibility and laughs at the man who has learned to take life seriously. Because the love of truth originates from instincts, Nietzsche treats it as a mere instinct, and nothing else. He forgets that in the evolution of man's soul, all instincts develop into something higher than instinct and the love of truth develops into systematic science. He never investigates what his self consists of. He never analyses his individuality. Otherwise he would have learned that he has received the most valuable part of his being from others and that that bundle of instincts which he calls his sovereign self is nothing but the inherited heirloom of the ages that have preceded him. In spite of his repudiation of owing anything to others, he is but the continuation of others. But he boldly carries his individualism, if not to its logical conclusions, yet to its moral applications. When speaking of the Order of Assassins of the times of the Crusades, he says with enthusiasm : " The highest secrecy of their leaders was, ' Nothing is true, everything is allowed ! ' " And Nietzsche adds : " Indeed that was liberty of spirit, that dismissed even the belief in truth." The philosopher of instinct regards even the adhesion to truth as slavery and the proclamation of truth as dogmatism.

Nietzsche's influence is increasing in Germany, as may be learned from the appearance of a weekly journal, *Der Eigene*, which promises to be an exponent of his

modes of thought. It announces itself as "a journal for all and nobody," and "sounds the slogan for all egoists" calling on them to preserve their ownhood. It proposes to antagonise all ideals of the brotherhood of man in the religious, ethical, altruistic, social, and communistic fields. It decries monopoly in every form, wages war against all democratic programmes, all aspirations of equality, including charity-maniacs in every form and slumming (*Pöbelbeglückung*); it antagonises, bureaucracy and all rules. It does not expect social salvation from the socialistic abolition of private property, but from an unimpeded personal appropriation, the realisation of which appears in a free market and the unconditional *laissez faire, laissez passer*. It expects to attain liberty by strengthening the single individual, which is to build up egotistical communities. It repudiates the plan of revolutionising the masses, and the use of violence. It stands up for the pathfinders in literature and art, for personality, for that which is characteristic. However interesting one single thinker may be who defends eccentricity as a principle, we are sure that a whole school of the same type would soon become tiresome. It is quite an entertainment to read Nietzsche, his followers are simply bores. A mode of thought the sole merits of which consist in its originality, loses all value when reproduced in imitations.

KPS.

KONNTE JESUS IRREN? Unter dem geschichtlichen, dogmatischen und psychologischen Gesichtspunkte principiell beantwortet. By Dr. Paul Schwartzkopff. Giessen: J. Ricker'sche Buchhandlung. 1896.

The same author whose booklet on "the prophecies of Christ concerning his death, resurrection, and second advent," we discussed in the last number of *The Monist*, has worked out another booklet on a problem which is closely connected with his former work and keeps in harmony with the whole plan of a greater work on "God's revelation in Jesus Christ according to its content, extent, and limits," and Professor Schwartzkopff has the happy disposition of hitting the problem which is the most salient of all, and which when solved will elucidate a number of minor problems. Most theologians are busy with minor problems, and do not consider that their solution is of little account so long as those great central problems remain unsolved. The investigation of Christ's prophecies concerning his own second advent lead Professor Schwartzkopff deeper into the fundamental question, Could Christ err?

If we are led to the conclusion that Christ actually did err, our author asks, must we not surrender Christianity, and does not Christ cease to be the God-man in whom God's revelation appeared in its highest and most perfect fulfilment. Professor Schwartzkopff denies these questions with great decision, for he claims that Jesus was not only truly God but also truly man; and his liability to error is one of the most important consequences of his human nature. The problem for a Christian, he claims, is to determine the limits within which Jesus was liable to err.

Although a Christian of outspoken Christian convictions, Schwartzkopff takes

the view, and entering into the details of the accounts of the Gospels proves, that Jesus actually did err. The cursing of the fig-tree not only proves that Jesus sought for figs where if he had been omniscient he ought to have known that there were none. Schwartzkopff spurns the interpretation of the passage that Christ simply for the purpose of conveying a lesson pretended not to know and simulated only to be disappointed, for that would cast the reproach of hypocrisy upon him. The facts of the story are that Jesus was disappointed, that he gave expression to his disappointment in cursing the fig-tree, and also that the gospel writers tacitly presuppose that Jesus could err. It is to them a matter of course that he could be disappointed. If the story is to be understood in the symbolical sense, meaning that Jesus was disappointed to find the Jews not as responsive to his teachings as they ought to have been, this does not change the main question which here also implies disappointment on the part of Jesus.

In a similar way Jesus shows his lack of omniscience by quoting the one hundred and tenth Psalm as a Psalm of David, which, as we now positively know, was neither written by David nor intended to have any reference to a Messiah. The inscription of the Psalm "By David a Psalm" does not belong to the original text, and is an addition of the editors of the Psalms.

The Psalm begins: "A declaration of Jahveh to my Master. Sit at my right hand until I lay thy enemies before the footstool of thy feet." The singer could not have lived in the times of David, because in David's time the king was at liberty to perform priestly functions. There would be no sense in declaring that, as stated in verse 4, "he should be a priest forever after the order of Melchizedek." There ought to have been a special historical occasion for this peculiar way of addressing the king as "priest-king," and this occasion actually occurred in the history of Israel when the ideal of a theocratic kingdom rose into being under the post-exilian king Zerubabel. The prophet Zechariah (Chap. vi., 12-13) proclaimed that Zerubabel as "the scion" (that is, as the Messiah), should unite the kingdom and priesthood in one person.

Here Jesus, as in several other things, simply accepts the tradition as established at his time in Judæa. He takes it for granted that the Psalm was written by David because the scribes of his time said so, and with their limited means of critical investigation were satisfied that it was true. Similar instances of errors of Jesus are found in his belief in demoniacal possession and also in his reference to "the sign of Jonah."

Schwartzkopff points out that even one instance of an error is sufficient to prove that Jesus could err, but, he continues, that the errors in such points as do not touch his great mission of salvation only prove that Jesus was truly man. It does not disprove that he was at the same time God and the Son of God. Thus the errors of Jesus are unessential in Christian belief, and it is better for Christology to face the problem fearlessly and to state the argument than to avoid the question and shun an investigation which would go down to its ultimate principle. More-

over Schwartzkopff adds: "It is a matter of course that Christianity can only gain by an elucidation of the truth."

Schwartzkopff devotes the main part of his booklet to proving that Jesus, in order to be truly man, must have had a specific human character of his own, which was conditioned by surroundings and the laws of psychological evolution. As in his physical constitution he was subject to all the ailments of bodily infirmities, to disease, pain, and death according to natural laws, so we must grant that his spiritual life, too, was truly human, which includes that under given conditions he was liable to err, to be mistaken, and to be disappointed.

That a liability to error implies moral defects, Schwartzkopff denies, and he contends that sinlessness does not as yet imply intellectual infallibility; and this is the most important point which his booklet makes. The Christian who understands this will no longer have an interest in glossing over errors which a critical investigation of the New Testament will have to attribute to Jesus. There will no longer be any motive for shunning the truth, or to be afraid of the outcome of New Testament criticism. Occasional errors caused by special surroundings, and due to the conditions of the age are not incompatible with the fact that the salient truths of salvation were revealed fully in Jesus who as such is the Christ and the Son of God.

K.

THINKING, FEELING, DOING. By *E. W. Scripture, Ph. D.*, Director of the Psychological Laboratory in Yale University. Meadville, Pa.: Flood and Vincent. Pages, 308. Illustrations, 209. Price, \$1.00.

We approach the task of critically weighing this work with feelings born no less of kindness than of justice. Catching the contagion of the football-season last autumn, professors and valiant knights of the pen all over the country have seemed incapable of conceiving a merrier sport than the belaboring of this poor little book, which is merely designed to popularise in an impersonal manner the results of labors which they or their betters have wrought from a sheer and disinterested love of truth. The reasons for this opposition are not far to seek, and lest our general estimate of the work be taken as an unqualified approbation, we may begin with a catalogue of its salient defects.

The first and most marked feature which has presumably given offence to Professor Scripture's colleagues, is his delightfully straightforward and frigid habit of depersonalising and disindividualising science—particularly when the personality is the mortal vehicle of some other luckless wight. This leaning to the Buddhistic ideal of science is laudable in a certain stage of the development of knowledge; but psychology is yet too young, yet too much colored by yearning and fame-seeking individuality, to undergo such radical and Procrustean disjointment. We have not observed that Professor Scripture has suppressed overmuch his own personality in the citing of scientific results, yet barring the last chapter, which treats of a few of the great investigators in modern psychology, we look in vain for a suitable and

systematic recognition of that vast and rich material which he has drawn from others and whose acknowledgment would, in a humanistic regard, have greatly heightened the value of his book.

The next appalling feature of the work is its Gargantuan verdancy, its Brobdingnagian arrogance. It is the mark of a great mind to unbend gracefully, but where grace and art are lacking, it is better it should be avoided. The fall from dignity consequent upon artificial familiarity and patronising, and all limping facetiousness, mar the beauty of a book, and tend greatly, by the raising of vulgar trivialities to the rank of science, to debauch the reader's mind. What impression do we get from the following specimens, to quote only one class? For example: "Are we to suppose that the many Englishmen are color-blind who can see in the Irish flag only a symbol of anarchy?" "How long it would take to recognise an object unwillingly, e. g., a tradesman by an English snob, has not yet been determined." "Alas! our whitest paper is a sorry gray when compared with God's white." Or, the thrilling detective story on page 147: "All is silence. The assassin in his hiding place feels secure from pursuit," etc. Or the wit in the facetious quotation of "' multitudinous syllabifications and frangomaxillary combinations' that pass as philosophic English." And the references to "Robbie" and to "Daisy," to "Baby," to "Kitty and the knothole." Surely these are not things that will make a fellow "laugh till his face be like a cloak ill laid up."

And then as to what we mean by arrogance. There is a mark of presumption reigning in the attitude of the author towards everything not achieved by the *tinker-psychology* of the laboratory. We get the impression that there is naught of merit produced outside its bounds. Indulging in dreams and nonsense in the arm-chair and in the study is unscientific, but toying with pretty brass instruments, smoked drums, mazes of wire, and induction-coils, ringing infinite changes on the one idea of reaction-times, registering the barking-times of dogs and the grunting-times of pigs, fooling generally in the laboratory, is science in its highest and most ineffable essence.

All this rests on a vulgar and erroneous impression of what *experiment* really means—on an erroneous conception of science and on an erroneous conception of philosophy. We are all of us *incarnate bundles of experience*—bundles of mechanical experience,¹ bundles of sociological experience, and pre-eminently bundles of psychological experience. Every human mind is a microcosmic workshop. "Virtually," says Gauss, "we always experiment with our thoughts."² J. R. Mayer reached the law of the conservation of energy without a laboratory; and according to the *character* of the inquiry, this has been the case with many other of the great discoveries of science. It is wrong to say (p. 25) that "Galileo would never have discovered the law of falling bodies if he had not made the experiment." Histori-

¹ See Mach, *The Science of Mechanics*, pp. 83, 304, 26-28; and *The Open Court*, No. 209, 1891, p. 2923, "The Importance of Clearness and the Charm of Haziness."

² See *The Monist*, Vol. VI., No. 2, p. 171.

cally, he discovered the law *before* he made the "experiment";¹ its agreeing with the experiment was good for the law, but it was not the merit of the experiment. The static properties of the inclined plane were not only discovered without "experiment," but the accurate execution of the experiment designed by Stevinus was at the time virtually impracticable: in fact, it was not necessary. True scientific research is really a forestalling and exclusion of *all but a few experiments*—the corrective or corroborative experiments. And this forestalling is done in the head, not in helter-skelter performances in the laboratory. Experiment, properly understood, is the mark and key-note of our age. Its rôle in the establishment of single (and even determinative) facts, in the confirmation of hypotheses, and in the attaining of statistical results, is paramount; but, as a pure laboratory-method, it never made science out of a chaotic mass of facts. And hence it is that we shall continue to read just as edifying and instructive treatises on psychology by the right kind of "arm-chair psychologists" as we shall from some estimable directors of psychological laboratories. We intend no disparagement in these remarks of the remarkable results which "experimental" psychology has achieved; nothing can be accomplished by a psychology that is not experimental, in the proper sense of the word. Nevertheless, the idea or ideas destined to make of psychology a coherent discipline, though they may be evolved by a laboratory-psychologist, will never be the direct outcome of the present laboratory-methods.

More rational is the author's attitude towards philosophy, though even here we hardly think his estimate is adequate (p. 293). Certainly a sound philosophy, or at least a sound philosophic instinct, is more than "helpful" in special science; it is a prime necessity for fruitful and telling work; and we have only to compare the achievements of those who have it with those who have it not, to appreciate its paramount importance. We are also surprised to learn that the positive philosophy based on the special sciences "is very little known outside of Germany" (p. 293). Relatively, and considering the gross output of philosophy in Germany, it is as little known there as in America, France, or in England. But pardonable evidences of a Teutonomania leaning are noticeable in many parts of the book. On a growing acquaintance with the work of the rest of the world, this tendency in Germany-bred scholars is naturally and gradually reduced to its proper dimensions, as all who have suffered from the contagion will bear witness.

We may now address ourselves with equal frankness to the excellences of the book. They are not few, and are more solid and less adscititious than its defects. The conception of the work, the popularising of the methods and results of an important science, intimately connected with all the action of life, is a laudable one. In the execution of the task, the author has remained true to his intention of writing "plain, every-day English." The presentation in most cases is simple and

¹ Cf. Whewell, *History of the Inductive Sciences*, Vol. I., Book VI., Chapter II., Sect. 2; Mach's *Mechanics*, p. 130; and also the *Dialogues* themselves (German translation promised in the Scientific Classics, edited by Ostwald: Leipsic).

direct. He has perhaps fallen a little short of dignity in the use of catchy titles and illustrations, but he well knows the idiosyncrasies of his public and the methods by which its indifference is wont to be combated. If the people can learn psychology by the channels of Sunday newspaper advertising, then, shades of the gentle Fechner, let them learn it, and let us have more of it! Good medicine is good, surreptitious though be the ways by which it is smuggled into the system.

For the reader of sound average education, not susceptible of the misgivings which attack the bowels of a precisian in science, philosophy, and good literary form, and for the person whose native mental equipment places him beyond the reach of baneful infections of this character, we can cordially recommend the work, as a clear elementary compendium of the methods and results of the new laboratory-psychology—reaction-times, thinking-times, attention, the physics and mechanics of the senses, audition, vision, etc., etc. The descriptions, and accompanying illustrations, of instruments and apparatus, are a capital feature, and of sufficient value and rarity alone to repay the perusal of the work. The mechanical plan and typography also are commendable, and we must not omit to mention the occasional presence of valuable pedagogical hints.

So, then, let us God-speed this book on its course, trusting that our animadversions have not wholly outweighed our commendations, and above all things, that they will not interfere with the sale of a single copy of the book, nor leave a rankling thought in any man's bosom. If they have been frank and hard, they but correspond with the valiant openness with which the author himself has taken a whack at every philosophic pate he sees. "To the latter end of a fray and the beginning of a feast, fits a dull fighter and a keen guest." This audacious fearlessness of the book is its most hopeful quality. A man that will fight will mend.

THOMAS J. McCORMACK.

DES LIMITES DE LA PHILOSOPHIE. By *O. Merten*. Paris: J. Michelet. 1896, Pages, 300.

Dr. Merten is Professor of Philosophy in the University of Liège and is the author of a treatise on Popular Philosophy, of another on Ethics, and also of a critical study of Maine de Biran. In the present work he offers a criticism of the possibilities and scope of philosophy which as he claims has been untouched since Kant, yet is the most important of all questions in this domain. He finds that we are living in a period of intellectual lassitude quite similar to that which existed in the time of the great Königsberg philosopher. He asserts that philosophy is still tainted with the discredit which became linked to it in the time of Hegel, and that it is now high time that it should leave off the attempt to solve vain and impossible problems, and devote itself to the more real and pressing tasks of the hour. Either philosophy must perish or renounce entirely those illusions whose pursuit long since demonstrated its infirmity in the eyes of humanity. Philosophy must break definitely with the hypotheses which have been set up so often in the course

of its history and substitute for its gratuitous and hazardous assertions, which have so often impeded the march of the human mind, the severe and rigorous procedures of science. What is needed is the marking off of the real limits of knowledge—a task to which the author applies himself by considering successively psychology, cosmology, theology, metaphysics, logic, ethics, and the State, and showing what can be attained in each. The points are in general well made and the exposition clear and simple. μ.

CORSO DI SOCIOLOGIA. By *Antonino De Bella*. Vol. I. Published by the Author : Nicotera (Calabria). 1895. Pages, 204. Price, L. 8.00.

The present work is the first volume of a projected series of five, entitled, respectively, General Sociology, Genetic Sociology, Juridical Sociology, Criminal Sociology, and Economic Sociology, in which the author proposes to deal exhaustively with all the varied data of social life. The Preface to this first volume on General Sociology has been supplied by Prof. Errico Demarinis. The discussion proceeds upon the basis of a comparison of sociology to biology, and is divided into the following books : (1) Elementary Physiology, treating of the cell and of sex, the tissues, the organs, and the functions of elementary organisms ; (2) The Physiology of the Complex Organs, treating of the functions of complex organisms, and of social circulation and respiration ; (3) Social Psychology, treating of the senses and motility, propagation and the means of social sustenance ; (4) Development and Disease, treating of social pathology and social physics ; and (5) of the Data of Psychology, treating of super-organic evolution and of the factors of super-organic phenomena. The masters to whom the author acknowledges special indebtedness are Lombroso, Haeckel, Lubbock, Benedikt, and Schiattarella. As the key-note of the author's idea is found in analogies with biology, he sees great possibilities in store for the human race, and ends his book with a fervent laudation of man's future. The same optimism pervades the entire first volume of the *Corso di Sociologia*, towards which the author has been working his way for several years by preparatory treatises on philosophy, psychology, and jurisprudence. μκρκ.

HEDONISTIC THEORIES FROM ARISTIPPUS TO SPENCER. By *John Watson, LL. D.* Glasgow : James Maclehose and Sons. London and New York : Macmillan & Co. 1895. Pages, 248. Price, \$1.75.

Professor Watson has attempted in this little book "to give, in familiar and untechnical language, a critical account of hedonistic theories in their historical succession." He is convinced, "as a result of this and other investigations, that no hedonistic theory can plausibly explain morality without assuming ideas inconsistent with its asserted principle." He takes up in successive chapters the views of the Greek sophists, of Aristippus, the Cyrenaic, of Epicurus, of Hobbes, of Locke, of Hume, of Bentham, of J. S. Mill, of Herbert Spencer, states them, and appends to his statements his own expositions. We have here in a lucid, simple, and brief

form an excellent summary and refutation of the main historical doctrines of hedonism—a doctrine which has taken a firmer hold of present-day thought than most people are aware of. μ.

THE IMITATION OF S'ANKARA. Being a Collection of Several Texts Bearing on the Advaita. By *Manilal N. Dvivedi*. London: George Redway. Bombay: Pandit Jyestaram Mukundji. 1895. Price, 5s.; and Rs. 3. Pages, 229.

Mr. Manilal N. Dvivedi, one of the most representative spirits of India, has condensed in a neat book of 229 pages the philosophy of the Advaita as held by S'ankara, believing that as Thomas á Kempis wrote *The Imitation of Christ*, and Bowdon *The Imitation of Buddha*, the Hindus should have an analogous book for their great leader of thought, S'ankara, which he has accordingly entitled *The Imitation of S'ankara*.

S'ankara lived at the beginning of the eighth century of our era, and was the very incarnation of strict Brahmanism. He was, as Sir Monier Monier-Williams says, "a more typical representative of Brahmanical doctrine than the legendary Viâsa, the alleged author of the Vedânta Sutra." We know little about S'ankara, except that he founded the monastery of Sringeri in Mysore, and some others in various parts of India. He wrote commentaries on the Upanishads, the Bhagavad-gîtâ, and the Brahma-Sutras. The great achievement which he accomplished by his glosses is the systematisation of the philosophy of the Upanishads. In addition there are numerous poems, large and small, which, as Mr. Dvivedi states, "survive on the lip of many a follower of the Vedânta of the present day." He vigorously opposed Buddhism, and became a leader in the reaction which re-established the Brahman religion and the philosophy of Self.

While opposing the Buddhistic doctrine of the non-existence of Self, S'ankara adopted those features of Buddhism which had become deeply rooted in the Hindu mind. Says Dvivedi, on page xv. in the Introduction: "He recognised the Truth "of the Lord's teaching, even to the extent of earning for himself the opprobrious 'title of a Buddha under Brâhmanic garb."

There is a report that he had used his influence to massacre Buddha's followers without mercy, but Dvivedi says that he is persuaded to believe that the story is not true, as it bears "evident marks of being an invention of those who may not be in sympathy with the Brahmanic revival under S'ankara."

S'ankara, if not the founder of the Vedânta philosophy, is yet its perfecter and main representative. He led "an erratic, restless, controversial life, and died early, probably at Kedârânâth, in the Himâlayas, at the age of thirty-two." (Quoted from Sir Monier Monier-Williams's *Brahmanism*, p. 56.)

Dvivedi's book, *The Imitation of S'ankara*, consists of a compilation of passages, which in a forcible manner set forth the Vedânta philosophy. It is a very handy and most convenient collection, which no one that is interested in Indian lore can dispense with. The English translation is accompanied by the Sanskrit text

which makes it easy to refer without trouble to the original, and to verify the translation.

The philosophy which Mr. Dvivedi expounds in *The Imitation of S'ankara* is the doctrine of the Self, and its identity with the Supreme Self, which is "the distinctionless, characterless, universal spirit, the properties of which can only be described in the language of contradiction," and is "best explained by the language of utter silence." The word "spirit" is, according to Mr. Dvivedi, "Essence, the being of things; not the realistic essence apart from things, but the abstract being wherein all beings partake and exist."

The Self alone is real, while what is commonly regarded as reality is unreal. "The consciousness which is the Self of one, is the same throughout all Selves. What differs is the *form*, the outer manifestation of the inner consciousness. The pure consciousness is called *Sat* (Being), *Brahman* (the All), *Atman* (Self), *Bhumā* (the Unconditioned), and so on; in truth, it is the Unnamable." (Pp. xxi-xxii.) "The highest moral good is Self-realisation, to which end experience, illusion though it is, provides the necessary training." Mr. Dvivedi declares that Fact is nothing, Idea is everything, and Education leads to the realisation of the Idea. "It is there your pulse beats with the pulse of nature, your heart responds to the heart of the universe, and you find yourself in all and all in yourself. 'Then has he access to all worlds, he has gained the empire of Self.' . . . The Self then melts, 'indeed, as a lump of salt in the sea.'"

The philosophy of the Self has its Western analogies in Kant's doctrine of the thing-in-itself and in the dualism of Supernatural Christianity. The Hindu conception is in so far more systematic and perhaps also more consistent, as it attains a peculiar Monism by its negation of the reality of the material universe.

We may be permitted to add, that the Philosophy of Science can accept the doctrine of Self neither in its Western nor in its Eastern garb. Science takes its stand on facts, the various forms of life, and consciousness, far from being indifferent or incidental are the most important feature of reality, while "pure consciousness," or "distinctionless, characterless, universal spirit," is a mere fiction.

While disagreeing with Mr. Dvivedi's philosophy, we warmly recommend his writings, for an essential condition of recognising the truth as a clear comprehension of the logic which led to the espousal of an error; and Mr. Dvivedi is, in his own line of thought, one of the ablest thinkers and a philosophical author of great vigor.

P. C.

THE GHERANDA SANHITĀ. A Treatise on Hatha Yoga. Translated from the Original Sanskrit by *Sris Chandra Vasu, B.A., F.T.S.* Bombay; "Tatva-Vivechaka" Press. 1895. Pages, 138. Price, 12 Annas.

This booklet of altogether 138 pages is very interesting to those who wish to have information concerning Yoga practices. The Yoga philosophy has been explained in almost all books on Brahman philosophy, but the modes and various

practices in which the Yoga was performed is not very well known. Here we have the Sanskrit text of about fifty pages, and a good translation of a book in which the sage Gheraṇḍa explains the Yoga to Chanda, his disciple, in seven lessons, which throw much light on things which it is sometimes very difficult for Europeans to understand. The Yoga methods are (1) a purification of the body, which includes practices of rinsing and cleaning all the passages of the body, the nostrils, the mouth, and the whole intestines; (2) postures of contemplation; (3) attitudes, which for some secret reason are supposed to be beneficial; (4) the method of restraining the mind by bringing the thinking principle under the control of self; (5) the practice of restraining the breath and limiting one's food; (6) the contemplation, or Dhyana, which is a trance-producing concentration of thought on objects of reverence; (7) on Samādhi Yoga, or the highest kind of Yoga. This last practice leads to the recognition: "I am Brahma, I am nothing else, the Brahma is certainly I, I am not participator of sorrow, I am Existence, Intelligence, and Bliss; always free, of one essence."

The promises held forth to various practices are such as becoming free of disease, preventing decay, of assistance in crossing the ocean of existence, the accomplishing of all desires, making the body divine, opening the gates of emancipation, preventing premature death, etc., etc. There are repeated injunctions to keep the teachings secret, and to communicate them only to the faithful. Thus we read, for instance, on page 28, concerning the Air-Tatva: "By its virtue one walks in the air. This should not be taught to the wicked or to those devoid of faith. By so doing success is lost; O Chandi! this is verily the truth."

The booklet has an additional interest by throwing light on the methods employed by those who allow themselves to be buried alive. Mr. Sris Chandra Vasu tells on the authority of General Ventura of Paris and of Col. Sir C. M. Wade, of London, a case of a fakir who, in the presence of Runjeet Sing, the Maharaja of Lahore, allowed himself to be buried alive. For preparatory measures it was necessary to cut the *frenulum lingue* and by long practice to elongate the tongue until it could, when placed backward in the mouth, cover the orifice of the hinder part of the *fossæ nasales*. Further it is necessary to practise the holding of the breath for a long period. "Novices, in trying the experiment, shut their eyes, and press them with their fingers, as also the cavities of the ears and nostrils, because the natural warmth of the body might cause such an expansion of the enclosed gas as otherwise to produce, by the violence of its pressure, a rupture of some of those delicate organs not yet accustomed by practice to endure it."

The fakir swallowed a small strip of linen in order to cleanse the stomach, and drew a quantity of water through the anus into the intestines, which, with some practice, can be performed while sitting in a vessel filled with water to the height of the arm-pits. He stopped all the natural openings of the body with plugs of aromatic wax, placed back his tongue into his mouth so as to stop the nostrils, crossed his arms over his breast, and thus suffocated himself in the presence of a

multitude of spectators. He "was placed in a chest, on which the Maharaja put a "strong lock. The chest was buried in a garden, outside the city, belonging to the "minister, barley was sown on the ground, and the space enclosed with a wall and "surrounded by sentinels. On the fortieth day, which was the time fixed for his "exhumation, a great number of the authorities of the durbar, with General Ventura and several Englishmen from the vicinity, one of them a medical man, went "to the enclosure. The chest was brought up and opened, and the fakir was found "in the same position as they had left him, cold and stiff. . . . One of the first "operations was to draw his tongue into its natural position; after this, a warm "aromatic paste, made from pulse-meal, was placed on his head, and air was in- "jected into his lungs and also through the ears, from which the plugs are with- "drawn. By this operation the pellets in the nostrils are driven out with consider- "able force and noise, and this is considered the first symptom of his resuscitation. "Friction is then strenuously applied all over the body, and at length he begins to "breathe naturally, opens his eyes, and is gradually restored to consciousness."

The same fakir who was thus buried alive in the presence of General Ventura and the Maharaja of Lahore had been buried alive several times, once as long as four months. As to his later life's history, we are informed that there were complaints about him, and he was suspected of leading an immoral life. The Maharaja intended to banish him, but the fakir anticipated the punishment by eloping with a Katrany (woman of a Hindu caste) to the mountains, where he died and was burned according to the customs of the country.

The author of the present booklet, Mr. Sris Chandra Vasu, believes "that he who can pass four months below the ground without becoming a prey to corruption, may also remain there for one year." And, he adds, "indeed it would be impossible to fix a limit to the time during which the vital functions may be suspended." This, however, appears to us very improbable, as the winter-sleep of a bear is limited also, and would most likely terminate in death if it were greatly prolonged. The suspension of the vital functions can probably be endured only within very definite limits. The story is very strange, but so far as medical experience would allow us to judge, it is by no means impossible.

P. C.

BARLAAM AND JOSAPHAT. *English Lives of Buddha*, Edited and Induced by *Joseph Jacobs*. London: David Nutt. 1896. Pp. 56.

That the same subject should be painted in several Italian churches and in an old Chinese drawing¹ is a very curious fact, which at first sight appears incredible. Yet it is true. It is the famous story of the man in the well, who pursued by a wild beast hangs on the branch of a tree which is gnawed at by mice, so as to leave him no choice but to fall very soon a prey to death, and yet he enjoys himself by eating the honey that trickles down from the tree. The story is one of the old Indian

¹ Published in the *R. As. S. J.*, China Branch, XIX., I., p. 94.

legends that was embodied in the life of Bhagavan Bodhisattva, which tells us of a prince who was educated by his father in a palace where he would see neither sickness nor misery, nor death, and when he once left home, met with the sight of a leper, an aged man, and a corpse, which set him to thinking and induced him to lead a religious life. This story migrated from India through Persia into Roumania and Georgia, whence it spread all over Europe. The original Sanskrit text is lost, but we know enough about Buddha to be sure that a book of that kind might have existed. When translated into Pehlevi, the word Bhagavan was changed into Balavar, the *g* in Persian resembling *l*, and the *n* resembling *r* (Jacobs, p. xlvi). At the same time Bodhisat (that is, one who is to become a Buddha) changed its ending into *asp* which is common in Persian. The Pehlevi was translated into Arabic, where the title was changed into Bellauhar wa Bûdâsaf. The Greek copy, of which a manuscript of the fifteenth century is extant, was probably translated from the Syriac about 600 A. D. In addition we possess a Hebrew translation, a Georgian translation, and a number of others, among which are two Latin translations. From one of the Latin versions most of the Western editions of Barlaam and Josaphat are derived, which are altogether about forty or fifty.

The history of this story is very interesting, as there is no question about its original source and its various fates. Josaphat has been received among the saints of the Christian Church, although, as Mr. Jacobs informs us on the authority of M. Cosquin, "there is all the difference in the world between the two processes [of being regarded as a Saint of the Catholic Church and being duly canonised]. Inclusion in the Calendar only implies a verdict similar to that of a magistrate's court or a grand jury; a *prima facie* case has been made out. Before canonisation can be obtained, the searching cross-examination of the *Avvocato del Diavolo* must be triumphantly sustained. Modern scholarship has acted the part of the Devil's Advocate with the result that the next edition of the Roman Martyrology will not, in all probability, contain the names of Barlaam and Josaphat."

All the points of interest in the history of the Barlaam and Josaphat story are very interestingly set forth by Mr. Joseph Jacobs, and its pedigree is set forth in a table. The old English version of the "Lyf of Saynt Balaam" is reprinted in full, and the "Life of Prince Jehosaphat" in the London edition, 1783, is reproduced in fac-simile. The book is printed on fine antique paper and presents a very elegant appearance.

K.

IAMBELICHUS ON THE MYSTERIES OF THE EGYPTIANS, CHALDEANS, AND ASSYRIANS.

Translated from the Greek by Thomas Taylor. London: Bertram Dobell. 1895. Pages, 391. Price, 7s. 6d.

If there is any truth in metempsychosis, we must look upon Thomas Taylor as the last reincarnation of the Greek spirit, and perhaps especially of Plato. He devoted to the study of Greek classics his whole life. He lived the life of an ancient sage. His religion was a belief in the Olympian gods of ancient Helas, and the philos-

ophy of his life was Platonism. Whoever wants a translation of the Greek classics in which the spirit of the original has been preserved, should procure Thomas Taylor's translations, but the trouble is that they had disappeared from the book-market and could only be had by good luck. It is for this reason that the publishers have undertaken to re-publish Thomas Taylor's translations in large print on elegant paper. The book before us, *Iamblichus, on the Mysteries of the Egyptians, Chaldeans, and Assyrians*, is too well known to all Greek scholars to be dwelt upon. We may only say that the translation, so far as we have examined it, is very appropriate and lucid. The additional notes are brief so as not unnecessarily to swell the book. The main defect of the book is the absence of an index which in such a work as the present one is a great desideratum, and should not have been omitted.

K.

A STUDY OF DEATH. By *Henry Mills Alden*. New York: Harper & Brothers. 1895. Pages, 349.

This book is a study of the problem of death, not its solution, and the author has apparently written it to satisfy his own state of mind concerning the saddest experiences of life. The main argument seems to be that at death we shall be changed, but what new embodiment will await us, the author declares, we are unable to understand. A new sensibility would, even in this life, reveal to us a new universe. How much stranger will be the new embodiment which we are to receive in the transformation of death, "that death in which we have no part and that has no part in us." The new embodiment, if not consisting of flesh and blood, need not necessarily be immaterial. It may, and probably will be, a new sensibility and a new thought which will involve space and time as forms to which our corresponding terms of space and time would be merely analogous.

K.

THE THEOSOPHY OF THE UPANISHADS. Part I. Self and Not-Self. London and Benares: The Theosophical Publishing Co. 1896. Pages, 203. Price, 3s. net.

The anonymous author of the present book explains the theosophy of the Upanishads under the following headings: (1) The Beginning of the Way; (2) The Higher Self; (3) The Supreme Self; (4) The Three Worlds; (5) Death and Rebirth; (6) The Way of Liberation; (7) The Eternal; (8) Life and Form; and (9) Conduct. He says that man, while all the time striving for the gratification of desire, is unable to find a resting-place. Desire has no limit, and the things by which we seek to satisfy it are very limited (p. 41). We can assure no complacency to our personalities (p. 67). This is "a dark enough shadow, the treachery of desire, the insecurity of things, the inevitable end of it all; crying, we enter,—this is life; crying, we depart,—this is death" (p. 70). But "the shadow is cast by the dawning inner light," which is "a power within us behind our personalities . . . the self of our very selves" (p. 71). And the doctrine of self is the foundation of

the Upanishads. The author says: "Behind the habitual Self is the Higher Self; 'behind and above this, the Supreme Self of all beings, the Eternal. Compared 'with this primary reality, all else is unreal, or has only a secondary, inferior, 'dependent reality. And this dependent reality, the outward world, the world 'outward from the Self, is a power, an energy, a potency of the Self, exercised by 'the Self, for the purposes and to the ends of the Self."

From this standpoint, "the only direct reality we have primary knowledge of, is the reality of the Self." While "the existence of not-self is reached by inference, argument, and deduction" (p. 105). The ethics of this philosophy is to establish a unity with the Supreme Self—"the one which appears as many, which gratifies the desires of many, and guides the destinies of the many back again toward 'the unity of the Eternal."

The Upanishads have exercised a great influence over mankind. They are those philosophical books which continued the Vedic literature of Old India and prepared that great religious movement which was inaugurated by Gautama Buddha, which, however, was a temporary suppression of the philosophy of the Upanishads; for Buddhism antagonises the philosophy of the Self by denying its existence. Buddhism replaces the belief in Self by a recognition of the spirituality that pervades the facts themselves. After the expulsion of Buddhism from India, the doctrines of the Upanishads became again the dominant philosophy of India, and have remained so to the present day; they are also the gist of theosophy. κ.

DER GEIST DER NEUEREN PHILOSOPHIE. (Part II.) By *Robert Schellwien*. Leipzig: Alfred Janssen. Pages, 168. Price, M. 2.40.

The second part of Schellwien's book reviews the philosophies of Leibnitz, Jacobi, Kant, Fichte, Schelling, Hegel, and a few later thinkers. The last chapter is entitled "The System of Human Life Outlined," reverts to the author's original views, which we presented to our readers in *The Monist*, Vol. V., No. 4, p. 624. Mr. Schellwien says: "If existence were not all-power, which is identical with 'itself, there would be no knowledge; and if man, in his own way, were not all-power, there would be no human knowledge. The creative original power is 'immanent in man. . . . In its negativity the all-power is Unconsciousness, or the 'life of Nature. . . . Man is at the same time an individual Being and an All-being. [P. 157.] . . . The spirit of man is truly the same spirit that aboriginally 'created the world, but in man the spirit displays only a recreative activity, yet 'always proceeding from nescience." (Pp. 167-168.) κ.

PERIODICALS.

THE AMERICAN JOURNAL OF PSYCHOLOGY. Vol. VII. No. 2.

SEX AND ART. By *Colin Scott*.—ON THE DEVELOPMENT OF VISUAL PERCEPTION AND ATTENTION. By *Harold Griffing, Ph. D.*—THE RECOGNITION-THEORY OF PERCEPTION. By *Arthur Allin, Ph. D.*—RECOGNITION. By *Arthur Allin, Ph. D.*—PSYCHOLOGICAL LITERATURE.—NOTES.—(Worcester, Mass.: J. H. Orpha.)

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PSYCHOLOGY AND PHYSIOLOGY. By *George Stuart Fullerton*.—STUDIES FROM THE HARVARD PSYCHOLOGICAL LABORATORY. (III.) Communicated by *Hugo Münsterberg*. THE PLACE OF REPETITION IN MEMORY: *G. W. Smith*. ASSOCIATION (II.): *Mary Whiton Calkins*. THE SATURATION OF COLORS: *L. M. Solomons*. FLUCTUATIONS OF ATTENTION (I.): *U. P. Hylan*.

PROCEEDINGS OF THE FOURTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, 1895. By *E. C. Sanford*.—ADDRESS OF THE PRESIDENT. By *J. McKeen Cattell*.—CONSCIOUSNESS AND TIME. By *C. A. Strong*.—STUDIES FROM THE HARVARD PSYCHOLOGICAL LABORATORY. (IV.) Communicated by *Hugo Münsterberg*. THE PSYCHICAL CHARACTERISTICS OF ATTENTION: *R. MacDougall*.—DISCUSSION, ETC.—(New York: Macmillan & Co., 66 Fifth avenue.)

MIND. NEW SERIES, No. 17.

THE LOGIC OF GEOMETRY. By *B. A. W. Russell*.—SENSE, MEANING, AND INTERPRETATION. By *V. Welby*.—LOCKE'S THEORY OF MATHEMATICAL KNOWLEDGE AND OF A POSSIBLE SCIENCE OF ETHICS. By *James Gibson*.—PHILOSOPHY IN ITS NATIONAL DEVELOPMENTS. By *Professor Knight*.—ON THE APPARENT SIZE OF OBJECTS. By *W. H. R. Rivers*.—DISCUSSIONS, ETC.—(London and Edinburgh: Williams & Norgate.)

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TRUTH AND THE TESTS OF TRUTH. By *Alfred Hodder*.—THE RELATION OF SHAFTESBURY AND HUTCHESON TO UTILITARIANISM. By *Dr. Ernest Albee*.—THE CONCEPTION OF MORALITY IN JURISPRUDENCE. By *Dr. T. W. Taylor*.—REFUTATIONS OF IDEALISM IN THE "LOSE BLÄTTER." By *Prof. J. H. Tufts*.

—DISCUSSIONS: Mr. Balfour's Criticism of Transcendental Idealism. By *Prof. W. M. Daniels*.—BOOK REVIEWS, ETC.

THE HUMIST DOCTRINE OF CAUSATION. By *W. W. Carlile*.—THE NATURE OF INTELLECTUAL SYNTHESIS. By *Prof. J. E. Creighton*.—GRAECO-LATIN AND GERMANIC ART. By *Albert Gehring*.—DISCUSSION: Non-Euclidean Geometry and the Kantian *A Priori*. By *F. C. S. Schiller*.—BOOK REVIEWS, ETC.—(Boston, New York, Chicago: Ginn & Co.)

REVUE DE MÉTAPHYSIQUE ET DE MORALE. Vol. IV. No. 1.

LOUIS PASTEUR. By *E. Bataillon*.—IDÉES CONCRÈTES ET IMAGES SENSIBLES. By *Louis Weber*.—LA LOGIQUE DE HEGEL: LE DOGMATISME DE HEGEL (continued). By *G. Noël*.—ÉTUDES CRITIQUES.—(Paris: Armand Colin & Cie.)

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L'HÉGÉMONIE DE LA SCIENCE ET DE LA PHILOSOPHIE. By *A. Fouillée*.—LE MOI DES MOURANTS. By *V. Egger*.—LE LANGAGE RÉFLEXE. By *Ch. Féré*.—EXPÉRIENCES SUR UNE ILLUSION VISUELLE NORMALE. By *Duprat*.—LES TRAVAUX SUR LE NÉO-THOMISME ET LA SCOLASTIQUE. By *Picavet*.

LA VIE ET LA MORT. By *F. le Dantec*.—LE LOBE OCCIPITAL ET LA VISION MENTALE. (Continued.) By *J. Soury*.—NOUVELLES MESURES DES ILLUSIONS VISUELLES CHEZ LES ADULTES ET LES ENFANTS. By *J.-J. Van Bieveliet*.—LA LOGIQUE SOCIALE D'APRÈS M. TARDE. By *G. Belot*.—ANALYSES ET COMPTES RENDUS, ETC.—(Paris: Felix Alcan.)

VIERTELJAHRSSCHRIFT FÜR WISSENSCHAFTLICHE PHILOSOPHIE. Vol. XIX. No 4.

DIE ANWENDUNG DES FUNCTIONSBEGRIFFES AUF DIE BESCHREIBUNG DER ERFAHRUNG. By *J. Kodis*.—ABLEITUNG EINER RASSENHYGIENE UND IHRE BEZIEHUNGEN ZUR ETHIK. By *A. Ploetz*.—DIE METAPHYSIK IN DER NATIONAL-ÖKONOMIE. By *F. Blei*.—BEMERKUNGEN ZUR ALLGEMEINEN PHYSIOLOGIE. By *R. Wlassak*.—(Leipsic: O. R. Reisland.)

ZEITSCHRIFT FÜR PSYCHOLOGIE UND PHYSIOLOGIE DER SINNES-ORGANE. Vol. IX. Nos. 5 and 6. Vol. X. Nos. 1 and 2.

ZUM PROBLEM DER UNBEWUSSTEN ZEITSCHÄTZUNG. By *Karl Groos*.—DAS GEFÜHL UND DAS ALTER. By *S. Ottolenghi*.—DIE AUFMERKSAMKEIT UND DIE FUNKTION DER SINNESORGANE. By *W. Heinrich*.

ZUR PSYCHOPHYSIK DER GESICHTSEMPFINDUNGEN. By *G. E. Müller*.—UEBER DAS AUGENMASS DER SEITLICHEN NETZHAUTTEILE. By *Guillery*.—KRÜMMUNGSKONTRAST. By *Alois Höfler*.—LITTERATURBERICHT.—(Hamburg and Leipsic: Leopold Voss.)

ZEITSCHRIFT FÜR IMMANENTE PHILOSOPHIE. Vol. I. No. 1.

EINFÜHRUNG. By *M. R. Kauffmann*.—URSPRUNG UND ELEMENT DER EMPFINDUNG. By *Richard v. Schubert-Soldern*.—BEGRIFF UND GRENZEN DER PSYCHOLOGIE. By *W. Schuppe*.—DER PSYCHOLOGISCHE MONISMUS. By *Ilariu Socoliu*.—DIE ERKENNTNISSTHEORETISCHEN GRUNDLAGEN DES HISTORISCHEN MATERIALISMUS. By *Franz Marschner*.—(Berlin: Dr. R. Salinger.)

ZEITSCHRIFT FÜR PHILOSOPHIE UND PHILOSOPHISCHE KRITIK.

Vol. CVII. No. 2.

PLATON ALS KRITIKER ARISTOTELISCHER ANSICHTEN. By *H. Siebeck*.—UEBER GLAUBE UND GEWISSHEIT. By *J. Bergmann*.—FRIEDRICH NIETZSCHE. Eine moralphilosophische Silhouette. By *G. Simmel*.—ZUR GESCHICHTE UND LITTERATUR DER PHILOSOPHIE IN UNGARN. By *Prof. Dr. M. Szlavik*.—DAS ERINNERN. By *J. Müller*.—DEMOKRITS ETHISCHE FRAGMENTE. Ins Deutsche übertragen. By *K. Vorländer*.—RECENSIONEN, ETC.—(Leipsic : C. E. M. Pfeffer.)

THE INTERNATIONAL CONGRESS OF PSYCHOLOGY AT MUNICH.

The next International Congress of Psychologists will be held on August 4th to 7th, 1896, in Munich. All persons desirous of promoting psychological research are invited to take part in the meetings of the Congress which may be done by sending the name of the paper or address to be read, before the 15th of May, 1896, and by paying the subscription of fifteen shillings. Papers may be read in German, French, English, or Italian, and are limited to twenty minutes. The programme of work consists (1) of psycho-physiology, conducted by Professor Rüdinger and Graetz, and Dr. Cremer; (2) of the psychology of the normal individual, conducted by Professor Lipps, Dr. Cornelius, and Dr. Weinmann; (3) of psycho-pathology conducted by Professor Gräsehey, Dr. Schrenck-Notzing, and Mr. Parish; and (4) of comparative psychology, conducted by Professor Ranke, Dr. Hirth, and Dr. Fogt. The General Secretary is Dr. Frhr. von Schrenck-Notzing, Max Josephstrasse, 2/1.

THE MONIST.

THE HOLINESS OF INSTINCT.

I.

THE soul of man has commonly been regarded as the battleground of two opposing influences. These have been often conceived as extrinsic, namely, angels and demons, Evil and Good ; but more frequently as intrinsic and inherent, as elevating impulses upon the one hand, against degrading on the other ; soul against body, immortal against mortal.

The latter views fall mainly into two great classes, one in which both conflicting forces are regarded as equally immanent and indigenous ; the other, in which the higher or spiritual contestant is regarded as acquired or imported at comparatively late stages of development,—“breathed in,” as its name implies, by some superhuman power. According to the former view, the nobler impulses of man’s nature are proofs of his fall from a higher estate—remains of an Edenic condition of purity ; traces of a lost innocence and holiness. This is the view of the Old Testament theology, and has probably found its highest and most beautiful expression in Wordsworth’s familiar ode “On Recollections of Immortality.”

“Trailing clouds of glory, we do come from God, who is our home.”

The other, which is that of the New Testament, and of the Fathers and dogmatic theologians generally, is that of the two warring elements one is primitive, carnal, animal, sinful, while the other is secondary, spiritual, ethereal, holy. For example, Paul declares : “I know that in me, that is in my flesh, dwelleth no good

thing"; urges us to "mortify the flesh with the affections and lusts," and cries out in despair: "Who shall deliver me from this dead body" (literally, "body of death"). And not only Christian theologians, but Buddhist monks, philosophers of all creeds and of no creeds, poets, mystics, dreamers of every sort and age, have revelled in it and re-echoed it until it has become a part of the household furniture of the thought of the world.

The twofold constitution of man's nature, from a mere figure of speech has come to be regarded as a literal, material fact.

The higher part, generally known as the soul, is properly assumed to have become joined with the lower part or body, much as a flower-seed might have taken root in a patch of soil. It is admitted that they are absolutely dependent upon one another, the soul for its existence, the body for its graces, and not a scrap of ponderable evidence can be adduced of the possibility of the existence of either apart from the other, and yet in flat contradiction of every other similar instance in nature, the bitterest enmity is supposed to exist between them. The impulses of the body are, above all things, to be distrusted, repressed, and dreaded by the soul. "Whatever is flesh is sin," while the aspirations of the soul are equally certain to be opposed, thwarted, and, if possible, brought to naught by the body. "The mind of the flesh is enmity against God." The most favorable view that we are permitted to take of the body is that it is a slow, stupid, extremely exasperating, but useful servant; a necessary evil which must be tolerated and even humored to some extent, because it would be difficult to get along entirely without it. This was the feeling of the monk Francis d'Assisi, who, though so full of love for all others of God's creatures that he actually conceived and carried out the beautiful idea of formally preaching the Gospel to the birds and the fishes on the lake-shore, could only find it in his heart to say of his own body, when told that it had been so weakened by fastings and vigils as to be hopelessly diseased, "I have sinned against my brother, the ass."

But even this amount of contemptuous toleration is rare. More commonly the body is described and regarded as "a dull clod," a

"house of clay," a "sepulchre," a prison against the bars of which the imprisoned soul beats its wounded pinions until Death comes to its release. All of which is about as reasonable as if a buttercup should revile the soil which hung about its roots and forcibly prevented it from floating off across the meadow-lands with every zephyr that blew. The soil has not only produced the buttercup, but will produce, after it has passed away, thousands of nobler, grander forms than anything its shallow, little, golden pate could even conceive of. Even so the body-stuff of these ecstatic dreamers has not only produced them, dreams and all, (though how much to its own credit is to be doubted,) but has within itself grander and lovelier possibilities than even the loftiest imaginings can depict, to say nothing of the morbid, childish phantasmagoria which form the bulk of such "visions":

"Eye hath not seen, nor ear heard, neither hath it entered into heart of man to conceive the things which God hath prepared for them that love him."

But the truly "spiritually-minded" of all creeds do not stop even here. It is not enough for them to regard the body as a mere clog upon the flight of the soul, a passive hindrance to spiritual progress, but they openly declare war upon it as their soul's bitterest enemy, and as something actually sinful in itself, a creature so degraded and so essentially vicious, that to deprive it of its comforts, thwart its impulses, nay, even torture it and refuse to supply its simplest wants, becomes positively meritorious. The renunciation (in plain English, cowardly desertion) of wife and children, parents,—in short, of all family and social ties, the abstaining from food, from drink, from shelter and warmth, scourging the back with chains until the blood comes, cutting the feet into ribbons by barefoot pilgrimages over stony roads, lying stark naked upon icy pavements all night long, and even such well-nigh ludicrous "mortifications" as wearing hair shirts, walking with peas in one's shoes, refusing to wash, comb the hair, change the clothing, have been accepted as deeds of saintly odor. In fact, the principle appears to be that the more a man can humiliate and torture his body, the more he will glorify and please the God who made it.

To such an extreme has it been carried, that not only are the selfish appetites and impulses of the body to be repressed, but even its kindly, altruistic ones. Paul commands us to "mortify the flesh, with the *affections*" as well as the lusts thereof; and even in our own century grave and learned theologians, after much deliberation, have decided that "natural goodness" and the "graces of nature" are sins in the sight of God, and even deeds of righteousness by the unregenerate will be counted against them as sins in the great day of judgment. To say that such utter antagonism between plant and soil, egg and nest, fish and water, child and mother, is not only absolutely unparalleled but flatly contradictory to everything else in nature, would be simply waste of breath, for we should be promptly informed that we were "no longer under nature, but under grace." Fortunately the retort, "Deliver us from such grace," though instinctive, is unnecessary, for the remorseless logic of events has already accomplished this. Wherever this belief has gone, it has written its progress in letters of blood. Its true nature stands revealed, in the filthy, degrading hermit-craze, in the black plague of monasticism, with its fever fits, the inquisition, Jesuitism, St. Bartholomew's Eve, and "religious" murders and persecutions of every description, and has left a broad, black, shameful brand across the pages of European history, which has come perilously near stamping a bar-sinister across the escutcheon of Christianity.

By experience utterly discredited, practically dead, it survives only in the formal theology of the modern church, though, fortunately, like many of its associates there, it has become pure theory which every one believes, but no one dreams of living up to.

The dual conception of man's nature, with its conflict between two great opposing forces, is strikingly similar to that which is held in regard to the world about us. And like it, will, I think, be found upon closer study, to be based upon a misunderstanding, a judging from appearances, without investigating the real nature of the phenomena.

When we come to weigh the question systematically "which is the greater," good or evil, passion or virtue, love or selfishness, we are promptly driven to the unexpected and even unwelcome con-

clusion that there is no ground for debating the question, as absolutely all of these "opposites" are found to be merely varying intensities under different circumstances of one and the same set of impulses. Passion is but blameless, healthful appetite run riot. Hatred is but righteous resentment become morbid. Envy is a jaundiced desire to excel.

When it comes to specific deeds and actual instances, the essential identity becomes even more obvious. The fault of gluttony, for instance, does not lie in the impulse to eat, for that is one of the great primal appetites, without which the race would soon cease to exist. Nor in the kind of food consumed, for that may be both wholesome and nutritious; nor in the absolute amount, for that might be easily digested by a more vigorous or needy individual, but simply in the relative excess, the failure to control an originally beneficent impulse.

The crime of theft consists, not in the impulse to appropriate, for that is thrifty as applied to material objects, and saintly as directed to spiritual graces; not in the nature of the thing appropriated, nor in the position, size, or color; not even in the uses to which it is to be put, or its usefulness or uselessness to the acquirer. A man may take anything, of any value, by any means, without becoming a thief, providing that he does not know or reasonably conjecture that it belongs to some one else. He has a right to anything that he can lift, providing no one else has a prior claim. His liberty in this respect leaves off only where some one else's begins. The crime lies solely in an actual or possible injury to somebody else, a failure to balance self-love by love of one's neighbor. Adultery and fornication are indulgences of the great sexual or race-continuing instinct under unlawful conditions, in other words, under conditions which experience has shown to be injurious instead of beneficial to the race. Even the crime of crimes, murder, which with its horrid front and gory locks almost appears to have a demon-like existence of its own, an essential, self-evident atrocity, consists not in taking the life of a fellow-being, for this is justifiable,—nay, even at times commendable, in war, in defence of country or loved ones, as an officer of the law, to protect the rights and property of

others, even in the defence of one's own life,—nor in the time, manner, or circumstances of the deed, but solely in the destruction of another's life and happiness for inadequate, selfish, or malicious reasons.

In short, the “principle” of every sin that can be mentioned, except lying, is a natural, beneficent instinct. Crime is simply lack of control. Right and wrong are broadly considered purely relative terms.

Absolutely no impulse is primarily and essentially evil or sinful, though any may become so, if uncontrolled. No action is *of itself* wrong,—the circumstances under which it takes place alone determine its moral quality. This statement will appear like a truism to all who have calmly considered the question, but its converse may not be quite so readily accepted, though equally true and important, viz., that there is no impulse so high or holy that it may not, if followed to an extreme, become both degrading and sinful, and no action so beneficent or so saintly that it may not under certain circumstances be both harmful and immoral.

Take, for instance, the noble instinct of parental affection, the purest and most unselfish flame which burns in these earthen lamps of ours, a grace which blesses alike the possessor and the receiver—the very corner-stone of morality; and yet the relentless ferocity of the tigress who has cubs, the tragedies of Lear and Père Goriot, and the hundreds of humbler instances, familiar to us all, of spoiled sons and petted daughters who have been utterly ruined and brought shame and bitterness upon their families, solely from the unreasoning devotion and blind indulgence of a fond mother or doting father, would at once suggest themselves as illustrations of how even the most sacred affection, in excess, may become immoral.

The injustice which affection may work to those outside of its scope, and the corruption even, which it will introduce into public life, have been epitomised in one word, “Nepotism.”

Again, take the religious impulse,—the instinct of worship, the adoration of the mystery of the universe. It is a feeling inspiring in itself and ennobling in its tendencies. It has covered the world with its prayers in stone, the noblest architectural achievements of

the race, its temples, its shrines, its mosques, its cathedrals. It has been the nurse of poetry, painting, and literature, and the very mother of music. But when the student of history turns to the reverse of its medal of honor, and reads its deeply-cut record of persecutions and penances, of wars and of massacres, of crusades and inquisitions, of burnings and torturings, of fanaticism, intolerance, and oppression, he is driven to admit that even this lofty impulse uncontrolled, rapidly becomes a hurtful and degrading one.

Indeed, the line is so easily crossed that he is in sad doubt at times which side of the medal should be hung outward.

Even our sense of duty, our enthusiasm for the right, which is supposed to be our most nearly divine attribute and to lift us furthest above the brute, is capable of sad perversion. It has inspired some of the noblest characters and grandest actions of history, and would appear to be the one safe and absolutely trustworthy guide for humanity. "Only follow this," we are assured by philosophers, prophets, and priests of all creeds, "and all will be well." It is probably the safest single guide, but there is not a folly or a crime into which blind and unreasoning obedience to it has not led.

It is a sense of duty which leads the Brahman widow to cast herself upon the funeral pyre of her husband. It was a sense of duty which drove the best of the later Roman emperors to persecute the early Church, that inspired the obliquities and atrocities of Ignatius Loyola, that impelled Calvin to burn Servetus, and urged the Puritan to banish and hang the Quaker, and burn and torture helpless old women. Indeed, the "higher" and more "spiritual" an impulse, the more capable of perversion it would seem, if not constantly checked by our "lower" but kindlier and healthier instinct and affections. If it were not for the vigorous and incessant opposition of our bodily tendencies, our spiritual ones would precious soon exterminate the race.

Which are really the "higher"? Morality, like sanity, is everywhere and always a question of balance, of control, of moderation.

Love of self impels us forward until we are checked or deflected by the other great natural instinct, second only to it in power, love of others, beginning with love of offspring and extending and broad-

ening to love of the family-circle, the clan, the nation, the race. For every passion nature has provided an affection as a counter-check; for every spring of action, a balance-wheel. Nay, more, if one passion becomes overbearing, all the others unite to oppose it. The path of Goodness, Sweetness, and Light is most surely reached and best followed, not by the deification of any one of our impulses and tendencies, but by an intelligent and reverent balancing of the promptings of all. That the resulting motion will always be in the right direction, is the Faith of those who believe in evolution.

This brings us to the question of the source and origin of what we are pleased to term our moral sense, those instincts which influence our conduct with regard to the rights and feelings of others rather than to our own, our altruistic impulses, the "sense in us for conduct," as Matthew Arnold terms it; and here is where the ray of the Fifth Gospel becomes far brighter and more cheering than that of the Fourth.

The position of St. John is a perfectly simple one. Conscience is the direct voice of God, "the Light that lighteth every man,"—a principle far above and utterly different from anything which would possibly have developed out of poor, sinful, selfish human nature. It is to over-ride, not only the passions, but also the affections and sympathies of humanity; nay, more, that all these are utterly contrary to and in opposition to it. "Whoso hateth not father or mother, for my sake, is not worthy of me." "Whosoever forsaketh father, or mother, or wife, or children, for my sake and the Gospel's shall receive . . . Eternal Life." Every natural instinct is thus practically placed upon the side of Wrong, and Right can only be saved from defeat by the continual interposition of the Deity. Human nature, which this Deity is supposed to have created in his own image, is not to be trusted for a moment. With such a view, is it any wonder that it has been a "religion of suffering," of sadness, and of despondency. "Narrow is the gate and strait is the way that leadeth unto Life, and few there be that find it." "For if the righteous scarcely be saved, where shall the sinner and ungodly appear?"

On the other hand, we have the "utilitarian" theory of Spen-

cer, the "greatest happiness" theory of Mill, the "refined selfishness" one of Bentham, all of which derive this exquisite faculty from the purely selfish impulses of man's nature. It is an enlightened self-interest, modified by experience, in fact. And I regret to say that modern evangelical Christianity has practically swung round to the same ground, inasmuch as the main incentive to right-doing which it urges, is the hope of escaping hell or gaining heaven.

Compare all of these with the view "from a natural standpoint," developed by the Master in his immortal chapter on the moral sense in *The Descent of Man*. Here is absolutely the only conception which does not compel us to regard it as either beginning or ending in pure selfishness. How much more noble, satisfying, and adequate it is can only be appreciated on careful study and comparison with the others. The source of morality is seen to be in the social instincts and sympathies which are derived, not from tempered greediness or chastened self-interest, which has been whipped within the bounds of decency by repeated bitter experiences, but directly from the warm, beautiful, and unselfish family affections. Here is a source and a sanction as truly divine as anything imagined by John. And, best of all, it is nothing foreign or hostile to the rest of our nature, but, on the contrary, a part of it. Every other faculty of our being subordinates itself to it, and shares and glories in its triumph. So far from the lower instincts being hopelessly at war with and anxious to destroy the higher, they are their originators and faithful friends, so faithful, that in many cases they save the latter from its own excesses. There is no "crucifying" to be done, for we could not possibly afford to dispense with either. The impulses of the "flesh" within their proper limits, are seen to be just as holy as those of the "Spirit."

The love of the mother for her babe, of the boy for his careworn mother, of the husband for his sweeter self, are as divine as the devotion of the saint and the self-denial of the anchorite, and infinitely more beautiful and wholesome. No tendency can be condemned simply by calling it human; not even by stigmatising it as animal, for these beautiful, natural graces are by no means confined to the human family.

We sometimes forget that the affections and embryo moral instincts are just as truly "animal" as are the passions and lusts. Humanity can boast of no nobler, truer emotions than the love of the doe for her fawn, or the dove for her nestlings, the reckless bravery of the bear in defence of her cubs, or the partridge in protecting her young, the fidelity of the lory to his mate, or the dog to his master.

Call the muster-roll of our virtues, and see how many of them have their origin outside the human family. What superiority dare we claim over the "brutes," the birds, the bees, the ants, in courage, in perseverance, in affection, in industry, in devotion, in patient endurance.

The pedigree of two-thirds of our virtues is far longer than the human race. They are backed by the inheritance, not merely of our whole human lineage, but by that of our infinitely longer pre-human ancestry. Their strength is drawn from the life of all the ages.

Call the roll of our vices, and see how the case stands with them. Here is the list of Paul, who was a connoisseur in such matters, judging from the number he has tabulated: "Fornication, uncleanness, lasciviousness, idolatry, sorcery, enmities, strife, jealousies, wraths, factions, divisions, heresies, envyings, drunkenness, revellings."

If for the first of these we read, as was probably intended, "prostitution," and omit such as are obviously repetitions, namely, "strife," "wraths," "divisions," "envyings," and "revellings," out of the ten that remain only three can fairly be claimed to be of animal origin,—lasciviousness, enmities, jealousies. The others are purely human accomplishments.

No animal has yet been found guilty of prostitution for hire, of drunkenness, nor for obvious reasons, of idolatry, sorcery, heresy (or the burning of the holders thereof), of factions, of hate, of gambling, of lying, of commercial swindling, and only a few of them have "risen" to the dignity of wife-beating, of cruelty to children, or of slavery.

Take it altogether, our animal ancestors have quite as good reason to be ashamed of us as we of them. Indeed, it would almost seem as if one of the most common uses that man had made of the elevation he had attained had been to fall from it. Certainly the "higher" an impulse is, the more distressing the perversion of which it is capable. "Lilies that fester smell far worse than weeds."

The cheering thing about it is that the pedigree of two-thirds of our vices is of mushroom length; that of our virtues reaches back through all the ages. Our virtues are older than we are.

What then is the true value of instinct as a guide? Of the very highest, popular impression and ecclesiastical teaching to the contrary notwithstanding. Instinct is the crystallised experience of thousands of generations. It is the golden seed-wheat chosen of a million harvests and a myriad threshing-floors. It ranks lower than reason because less of individual volition or judgment enters into it; but as a guide it is far safer, as a spring of action far more reliable and effective, and so far as it goes, has no superior. Our life-long struggle to form "good habits," as we say, is merely an effort to change rational preferences into instincts.

The beauty, the accuracy, and the beneficence of the instincts of the lower form of life have been the marvel and the admiration of every observer and philosopher,—nay, even of theologians. Out of a thousand instances we need merely suggest the architectural instincts of bees and ants, the migratory of birds and fishes, and the chrysalis-making one of grubs. But it is calmly assumed that in our own species alone they have utterly lost their force and value. Our pride would not permit us to depend upon or even recognise them, lest we should seem to admit our kinship to "mere brutes." Fortunately for us, they still remain with us in spite of our haughty refusal to officially recognise them, and control two-thirds of our actions; and it would be to our credit and benefit every way if they controlled the majority of the remainder. Every time we neglect them we suffer. It is, of course, hardly necessary to remind you that the great mass of our most important vital movements, such as breathing, swallowing, suckling, eating, drinking, walking, etc., would be impossible without them, but beyond all this, whenever

we can find an instinct to follow, it is safe to do so nine times out of ten, even under civilised conditions.

Ask any intelligent physician, and he will tell you that if civilised man would only follow his instincts in respect to fresh air, sunlight, exercise, food, water, bathing, etc., he would be far healthier, happier, yes, and more moral than he is. Our dyspeptic race would be better in every way, for a greater indulgence in "the pleasures of the table" (including *at least* twenty-two minutes for dinner), for more cat-like basking in the sun, for a good deal more "barbaric indolence," for more rebellion against the fiendish old Puritanic saw, that "Satan finds some mischief still for idle hands to do," for a more frequent giving way to the impulse to fling the yard-stick out of the window, and the ledger under the desk, and away to the woods, the fields, and the mountains; if the grown man would run away and "go swimmin'" as the boy does.

An excellent illustration is the case of intoxicants and narcotics. Did any one ever hear of a baby with an instinct for whiskey, or a child who enjoyed the taste of tobacco or the smell of a cigar? Tongue, nose, and stomach unite in their disapproval of all three, as the comic horror's of a boy's first smoke, and the racking headache of the freshman's spree abundantly testify. It is only by systematic and repeated repression of instinct by "reason" and "higher intelligence" that either of these habits is formed; yet we have the colossal impudence to say that a man who is reeling drunk has "*made a beast of himself*"!

And this is by no means an exceptional instance; indeed, it would not be too much to say that two-thirds of the diseases of civilisation are due to the neglect or deliberate repression of some instinct.

However valuable the instincts may be admitted to be in health, the almost universal impression is in both popular and professional circles that they are just the reverse in disease. The sick man is popularly supposed to want just those things he ought not to have, and to dislike just those things which are "good for him." And, indeed, altogether too much of both household and professional medical treatment was originally constructed on that very principle.

Its principal reliance was placed upon "bitters" of all kinds, the nastier the better, purges, emetics, asafœtida, blisterings, bleeding, starving,—in fact, the more disagreeable a drug or process, the more violent its effects, the greater its curative power was supposed to be. Even at this day a "medicine" must be bitter or it isn't much thought of by the patient, and a "hygienic dietary" is usually constructed simply by forbidding everything that the invalid has any liking for.

The simple truth of the matter is, unflattering as it may be to our professional pride, that even up to the middle of the present century the old demon-theory of disease had far too much influence over our therapeutics. Disease was still regarded as an entity which must be driven out of the body of the patient by more or less violent or repulsive means. This distrust of the instincts in disease is not medical, but priestly. The wonderful "progress of modern medicine" has consisted very largely in getting rid of this idea. Wounds, for instance, instead of being poured full of wine, or oil, or turpentine, or other irritating substances, or burned with hot irons, or kept gaping for weeks, "to establish suppuration," or dressed with earth, cobwebs, pitch, or even excrement, are now simply thoroughly cleansed, closed as accurately as possible, and protected by the softest and lightest of dressings. In short, we simply follow our natural impulses, imitate the lower animals, and the result is that our mortality rates, after both accidents and operations, are reduced fifty, sixty, and even eighty per cent.

In fevers, for instance, the parched and gasping patient, instead of being swathed up to his neck in blankets, kept in carefully heated and darkened rooms, with doors and windows religiously closed, forbidden cold water, or indeed cool drinks of any kind, as if they were deadly poison, and systematically starved upon a "fever regimen" of slops and washes of every description, is now placed between the coolest of sheets, and with the lightest of covering, in cool, breezy, sunshiny rooms, systematically fed with the most nourishing and digestible of foods, given all the water and fruit-juice he can possibly drink, not only bathed, but even put to soak in cold water.

Our most modern and most successful treatment of typhoid fever consists merely of a liberal milk-diet, encouraging the patient to drink at least a gallon of water a day, and plunging him into a cool bath whenever his temperature rises above a certain point. Again, we simply respond to the demands of poor, hot, thirsty nature; and by so doing have lowered the death-rate from sixteen per cent. to less than five per cent.

The value of instinct as a guide in morals is equally great, although there is here a certain amount of conflict between the individual or selfish instincts, and the social or altruistic ones. And, although it is true that the intensity of our necessary vital desires or appetites is oftentimes so great as to cause us to disregard the rights of others in their gratification, and thus violate our higher or social instincts, to sin, in theological language, yet it is also true, as beautifully pointed out by the Master, that the former are essentially temporary in their duration, and capable of but feeble recollections, while the latter are absolutely ceaseless in their action and produce by their violation lasting sensations, such as shame, remorse, loss of respect, feeling of isolation, etc., which become more vivid with each successive recollection. In fact, the higher instincts, though at the time feebler, are in the long run more than a match for the lower. It would be strange indeed if these instincts, which have *created* morals, were not still to be trusted in their domain.

What, then, is our final conclusion? That morality is natural, and instinct the holiest impulse that stirs man's bosom. Truth is mighty, and sweetness and light are winning qualities (in more senses than one). Morality has won its pre-eminence by "the right of the strongest," and has no need of assistance or protection from revelation, church, priestcraft, or state. Still less does it owe its origin or continuance to any of them. And yet almost every religion, every priestly order arrogates to itself the position of the true originator and only conservator of morality. Heaven forbid that it should rest on any such narrow and shifting foundation. Beautiful and inspiring as the spirit of worship is, and valuable and powerful as its influence, morality depends upon no one emotion or influence, but upon all the forces and pulses of nature. All the warmth of

man's nature, all the courage, the beauty, the vigor, of animal life, nay, even the beauty of the meadows, the sweep of the rolling tide, and the glory of the dawn, are in it and behind it.

Cut it off from the influence of any one of these, and it goes halting at once. Confide it to any one of these alone, and it withers and all but disappears. Even the religious instinct, for instance, must be balanced by the affections, the necessary appetites, the common sense of the masses, or the most painful and shocking perversions will occur. Of itself one of the purest and most exalted of emotions, it has earned itself as black a record as many of the vices, simply by having frequently been given unlimited sway over man's actions. The extremes of hatred, bigotry, and cruelty into which it has been led are, alas, household words, and in hatefulness, though not in frequency, equal, if not exceed those prompted by any of the "fleshy lusts." "Our army swore terribly in Flanders," but its profanity was not to be compared in either profuseness or malignity with the maledictions of an ordinary "sacrament" of excommunication.

The wrath of the "natural man" is fully appeased by killing his enemy, or at most scalping him afterwards, but that of the "holy father" or "shepherd of the flock" cannot rest at merely burning the heretic, but must damn his soul through all eternity as well.

The *superhuman* is sure to become the *inhuman* sooner or later. How much of the cruelty, intolerance, unscrupulousness, fatuous folly, which have too often marred the whole record of the Roman Catholic Church, have been due to her management solely by a body of professedly sexless clergy, who by their unnatural vow of celibacy are cut off from all the softening, humanising, ennobling, and refining influences of family life! What can they really know of the Great All Father, who are not and can never hope to be fathers themselves!

Morality is the flower born of all the struggling impulses of lowly but warm-hearted human nature, just as the violet is of the leaf-mold, the sunlight, and the dew. Any of the influences which had a *share* in its creation, *alone* would blight it, did not the others

come to its aid. Gentle as it is, it is irresistible and will flourish with equal placidity within our bosoms or among our ashes.

Beautiful, fragrant, and delicate though it be, it only asks the free air and sunlight of heaven, to defy alike the storm, the flood, and the tooth of time, and glorify the woodlands every spring until the sun grows cold.

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PHILOSOPHICAL TERMINOLOGY AND ITS HISTORY.¹

EXPOSITORY AND APPELLATORY.

I.

WHOEVER has at heart the interests of genuine monism, and would see the intellectual world united and a more intimate consolidation of human effort established, will joyfully welcome every attempt to close up the gaps in the realm of opinion and to facilitate mutual understanding. For this reason, if for no other, the peculiar language of philosophy is deserving of much greater consideration than usually falls to its share. From time immemorial the complaint has been made that philosophers frequently converse in different tongues and are incapable of understanding one another, that from this source no end of controversy has arisen and the advance of the work been materially impeded. And the further complaint has been made that the obscurity and ambiguity of its phraseology has utterly estranged philosophy from common life. There has been no dearth of projects for the removal of these undesirable conditions; but it is likely that more would have been accomplished had the language of philosophy itself been more closely scrutinised and studied. On the other hand, the field of terminology holds out unusual attractions to the scholar. A technical term, a mere word and sign, taken by itself, does indeed appear a matter of little moment, and, accordingly, it is very apt to be contemned. But if there is nothing insignificant generally for

¹ Translated from Professor Eucken's manuscript by Thomas J. McCormack.

science, the far-reaching connexions of the present subject with problems of broad interest and with the great intellectual movements of the present are so obtrusive that the fruitful issue of its pursuit cannot for a moment be doubted.

Technical terms take their rise in an intimate association, in a seemingly indissoluble union of concept and word. Things spoken and things thought, things of sense and things not of sense, are compacted by them into a unified product, and thus bear unmistakable testimony to the inward unity of the two worlds. A concept may carry on a species of existence without possessing a specific form of expression, but when such is the case it hovers like a spirit in the air and is apt to vanish again; at any rate its bodilessness prevents it from ever attaining a powerful stage of efficiency. On the other hand, a word may be current for a long time before it is taken up by science and converted into a vehicle for an idea. In such conditions there is wanting to it the significance that invests it with value for intellectual work. The union of body and mind, the intimate association of word and idea, alone creates the technical term. With the technical term a new being is born which has its own fortunes and its own history. The addition made to the subject by the word is by no means immaterial or subordinate, for a word is not empty and dead, but has a definite character, and awakens images and often emotions. There are words that affect us at once sympathetically, and others that as readily awaken in us antipathy, words that aid the idea or detract from it—felicitous and unfelicitous terms. One unfelicitous word of this class, for example, is the term *metaphysics*, the reason being that this word naturally awakens the impression that the philosophical study of first principles is concerned with something above and distinct from nature. Emotions are notably aroused by party names, because every one seeks to place his own cause in a favorable, and that of his opponents in an unfavorable light. Hobbes's remark on politics applies with equal force to philosophy (*De cive*, VII.); "solent homines per nomina non res tantum, sed et proprios affectus una significare." It is manifest, thus, that the history of terms is co-incident neither with that of ideas nor with that of words.

The scientific terms which we employ to-day as self-evident in their meaning are the results of the intellectual labors of ages. We are the debtors in this regard of the Greeks and the Romans, of mediæval scholasticism and of all the leading nations of modern times. Every single technical term, viewed in this light, may be considered as possessing a distinct individuality and may be biographically treated; it has its birth and its death, it attains prominence and becomes obsolete, or, it issues victorious from the struggle for existence and becomes the permanent possession of science. To pursue the biography of words through their principal phases is often a fascinating but not less frequently a difficult task. The first question is when and where, in what environment and under what conditions, as well as from what motives a technical term has originated. Even the outward circumstances of fact are not always easily disclosed; for the new does not always turn out to be new;¹ in the majority of cases no satisfactory explanation can be had of its origin; and at times its novelty is intentionally concealed. Furthermore, words which are subsequently in every one's mouth often occur first in extremely out of the way places. For example, the word *optimist* was probably first used by Jesuit scholars to describe the system of Leibnitz (*Mémoires de Trevoux*, 1737, February); *theodicée* was first used by Leibnitz himself in 1697 in a letter to the Italian scholar Magliabecchi; *natura naturans*—a phrase which attained exceptional prominence in the hands of Giordano Bruno and Spinoza—is taken, as Erdmann and Siebeck have shown, from the Latin translation of Averroes.

Circumstances of chance may have a large share in the production of a new technical term; and consequently the facts of its origin do not always enable us to make positive deductions as to the character of the accompanying intellectual operations. But ordinarily it is increased interest in the idea itself and a powerful sense

¹For example, Christian Wolff (*Phil. rationalis sive logica*, Cap. III., par. 85) says: "Datur alia adhuc philosophiæ naturalis pars, quæ fines rerum explicat, nomine adhuc destituta, etsi amplissima sit et utilissima. Dici posset teleologia." With regard to *sociology* Comte (*Cours de philosophie positive*, IV., 185) says: "Je crois devoir hasarder, dès à présent, ce terme nouveau."

of its want that produces a term; a confession of faith, or even a thesis, may be wrapped up in a word. Thus there were weighty reasons why the word *deist*¹ appeared during the intellectual stirrings of the Reformation period, and why the word *rationalist*² arose during the English struggles for independence; why the word *pantheist* was coined in England in the beginning of the eighteenth century,³ and why recent times also produced in England the word *agnostic*.⁴ The desire to give to important ideas a convenient expression and wider circulation is the most powerful factor in the production of technical terms. Consequently, in the matter of form, considerations of beauty, and even of etymological correctness are of small importance. When Alexander Baumgarten, the pupil of Wolff, introduced the word *æsthetics* as describing the science of the beautiful, there was no lack of opposition from philological quarters, but opposition could not prevent the installation of the word. Comte's *sociology* is more barbarous still, but its practical and formal utility silenced all linguistic scruples.

It is one thing to coin a word, however, and another to get it generally adopted. To attain this last goal, a word has often a long and hard road to travel, although in other cases its adoption is exceedingly rapid, one might almost say explosive in its character. Frequently, a word which is afterwards to become the common possession of all educated men, is restricted for a long time to the narrow precincts of a school. A passage in Xenophon tells us, for example, that in his time *cosmos*, as an expression for the universe at large,

¹In the *épltre dédicatoire* of Viret's *Instruction Chrétienne*, which appeared in 1564, we read: "Il y en a plusieurs, qui confessent bien qu'ils croient qu'il y a quelque Dieu et quelque Divinité, comme les Turcs et les Juifs. J'ai entendu qu'il y en a de cette bande, qui s'appellent Déistes, d'un mot tout nouveau, lequel il veulent opposer à Athéisme."

²Lechler, at page 61 of his *History of English Deism*, says: "In Clarendon's State-papers, Vol. II., p. xii of the introduction, an entry of the 14th of October, 1646, reads: "There is a new sect sprung up among them (Presbyterians and Independents) and these are the Rationalists; and what their reason dictates them in Church or State stands for good, until they be convinced with better."

³*Pantheist* was first used by Toland, 1705; *pantheism* by his opponent Fay, 1709.

⁴*Agnosticism* was coined by Huxley in 1859.

was still felt to be a strange term.¹ Lessing still treats *subjective* and *objective* as learned scholastic terms, whereas since Kant they have become securely established in common speech. The word *monism* coined by Christian Wolff only gained a limited circulation among the adherents of Hegel, and its present popularity is due to the modern theory of evolution.

As worthy of notice as its rise and adoption is the obsolescence and disappearance of a term. Conformably to the twofold motive underlying the creation of terms, the occasion of their production may reside either in the word or in the idea. The same idea can change its form of expression, or the term may grow obsolete because of the idea losing its ground. The change of the mere word is naturally less important, although in this case also there must exist good reasons why the change has occurred at a given time. Thus, there is a natural connexion between the sharp distinction drawn between mind and nature by Descartes and the reason why Robert Boyle introduced the term *materialist* to characterise thinkers who prior to that time had been called Epicureans or Democriteans.

But of greater importance, of course, is the fading away and disappearance of terms, for here we have palpable evidences of revolutions and transformations in the world of ideas. As the vocabulary of astronomy and alchemy vanished when they vanished, so the terms of philosophy lose their ground when the strata of thought disappear of which they are the expression. With scholasticism, scholastic terms also had to vanish. This last example, however, is an excellent instance also of the contrary proposition, that the fate of a term is not unconditionally bound up with that of the idea. A word which has fully established itself is a far too convenient implement, a far too powerful auxiliary to be given up lightly; and thus it comes to pass that men seek to save the word in the transformation of the idea and to adapt it to its new intellectual environment. This is what happened with the main terms of scholastic terminology broadly considered.

¹ Xenophon, Memor. I, 1, 11: ὁ καλούμενος ὑπὸ τῶν σοφιστῶν κόσμος.

After the Renaissance and the beginnings of modern philosophy had rejected this terminology wholesale, there was gradually brought about by a sort of inward transformation a renascence of scholastic terminology. How could we do to-day without words like *subjective* and *objective*, *formal* and *real*, *abstract* and *concrete*, *a priori* and *a posteriori*, *actual* and *virtual*, *individuality*, *ideal*, etc.? They are all children of scholasticism. If the meaning of terms changes thus while at the same time retaining some connexion with their earliest import, if amid all transformation such unmistakable continuity reigns, then certainly we have a right to speak of an inward history of terms,¹ and it is to be expected that this history will open a far deeper vista into the movement of thought than can their outward fortunes.

Before quitting this history, it is to be observed, that at times and in an analogous manner to the operations of organic nature, there are frequently left over, of whole groups and families of words, only a few species, which lead an isolated existence as survivals and are extremely difficult to understand. We speak nowadays of *moral certainty* (*certitudo moralis*); but we have no idea of what the expression *moral* signifies in this connexion until we resort to the terminology of scholasticism where moral is opposed to physical and has approximately the significance of "inward," so that, to cite an example, *causa moralis* was contrasted with *causa physica*.

The inward history of terms is extremely varied, and it can give distinct expression to mighty as well as to unobtrusive movements of thought with greater faithfulness and delicacy than any other method. We shall select only a few examples from the unlimited wealth of this field. Often we have brought to our notice the migration of a term from one province to another. Thomas Hyde, who in his book *Historia religionis veterum Persarum* (1700) was the first to use the expression *dualist*, denoted by the word a religious doctrine which simultaneously with the principle of the good posited a principle of evil of like eternality; and also Bayle used the word

¹ Lessing justly remarks, "the thing to which the usage of speech continues to give a definite name, certainly also continues to retain something in common with that thing for which this name was invented."

in this sense. But Christian Wolff applied the word to the relation of mind and body and so transplanted it into metaphysics. *A priori* and *a posteriori*, both late-mediæval terms, whose ultimate origin may be traced to Aristotle, first designated the opposition of deductive and of inductive procedure, but since the eighteenth century and particularly since Kant, have come to express the contrast between knowledge originating in pure thought and knowledge originating in experience. They have been transferred, accordingly, from methodology to epistemology. *Egoism* in the first half of the eighteenth century was the name of a theoretical doctrine which recognised the individual ego of the thinking person as the only real existent; in the second half of that century, the transition to its present meaning was effected.

In such transitions may often be found incorporated the broadest tendencies of contemporary thought. Towards the close of antiquity we see philosophical terms undergo a transformation from the theoretical into the practical and ethical. On the other hand, in the last few centuries the movement of thought has been from the objective to the subjective, from metaphysics to epistemology and psychology. Throughout the whole history of this period, terms for outward things (for example, *culture*, *organic*, *mechanical*) have been converted into terms for internal things. But this movement has an extremely variable tempo and exhibits the most diversified phases.

Furthermore, terms may exhibit extremely varied transformations of inward composition. By *monism*, Christian Wolff sought to describe that view of the world which regarded either the physical principle or the mental principle as the sole and ultimate substratum of reality. A word so artificial in its character as this, which embraced in the same class the extremest differences, could not of course establish itself. But the word existed and merely awaited employment in some other sense. This it found at the hands of the school of Hegel who were the first to employ it spiritualistically to designate a view of the world which conquered all self-contradictions and antitheses. The meaning which the word predominantly has at present in Germany most likely came from Haeckel and

Schleicher of Jena. However, while Haeckel identifies monism with mechanicalism and materialism, the editor of the present journal, which bears the name of *The Monist*, again broadens the meaning of the term, defining monism as a unitary world-conception, its method being consistency of thought and its ideal a harmonious and systematic presentation of the various aspects of truth.

Such transformative processes may extend over thousands of years and reflect in miniature all the main phases of evolution. For example, this is the case with the word *idea*. Not only in this word are such enormous differences clearly distinguished from one another as occur in the ontological and æsthetical thought of Plato, the religious speculations of Philo and Plotinus, the psychological of Descartes and Locke, and the transcendental of Kant, but almost every independent thinker has found expression of his individuality in delicate shades of usage of this word.

In such transformations terms may depart very widely from their original significations, nay, form a direct antithesis thereto; and they may in their career follow diametrically opposite paths. *Form* signified in scholastic usage the essence which shaped things from within; subsequently, outward appearance. *Evolution* in the eighteenth century was the name of Leibnitz's theory of development, which conceived all growth of organic nature as the mere swelling or enlargement of diminutive preformations—the so-called encasement theory, against which C. F. Wolff directed his famous *Theoria generationis*. But now this designation is borne by the *modern* theory of development, which inclines to the view of Wolff and is diametrically opposed to that of Leibnitz. Also the complete inversion of meaning is known which the expressions *subjective* and *objective* have suffered, as compared with their scholastic usage. Until the end of the seventeenth century the word *subjective*, being the adjective derived from and referring to *subject* or *subjectum*, had the precise significance that the word *objective* now has, and *vice versa*. The revolution in the meaning of this word started in Germany, and for a long time it was felt by other nations as a strange innovation. The transformation would hardly have been possible

had not the terms been transplanted into a different language and into a different intellectual environment.

So far we have regarded terms entirely as individual elements, but our subject acquires a far higher interest when we take up the study of the mutual relations of the individual elements and seek out the meaning of their union in larger organic groups. Here are to be met the most varied complications and interactions, now mutual reinforcement, now pronounced hostility, here quiet persistence, there rapid change—the whole a kaleidoscopic and frequently fascinating spectacle. Running throughout the whole there is a common effort traceable, a common seeking after the appropriate and adequate designation of the ideas controlling our thought ; everywhere we find acting, so to speak, a teleological principle, a principle of selection of the fittest. But this effort and aspiration does not come from without as the result of reflective thought ; it acts through and by way of the individual elements, and is their own intimate outcome. The elements must needs develop and do battle with one another, so as to show their potency. Looking at these individual events solely, we observe a predominantly molecular and mechanical action ; pure and actual matters of fact are displayed ; principles like heredity, struggle for existence, and adaptation to the environment play in this process at least a prominent part, if not exactly that which is observable in nature. The real motive factors cannot be clearly established until all is considered as a whole, despite the fact that we have their activity brought distinctly to our notice in the individual terms themselves.

Manifestly the existence of terms is subject to the conflicting influences of a tendency to persist and of a tendency to change, where *existence* means actual living employment in science as distinguished from mere historical occurrence. A term once in existence, now, is easily kept in existence by being handed down from generation to generation, or by simple heredity. A term offers to thought a convenient tool, an unfailing lever, and opens up extremely easy paths. It is given to us without labor on our part by the hand of tradition, and is communicated to us as a matter of course. Is there any wonder that we accept it calmly and continue

to employ it as it was given into our possession? A term has here all the impregnable authority of an ultimate fact. It is forgotten that often it contains more than a mere designation, and may be the embodiment of an extremely problematic opinion. We find thus displayed here a faculty of permanence, a genuine "natural inertia." We never recognise its potency more distinctly than in the stupendous power of resistance which established distinctions possess; it would seem as if they could never be made to loose their hold on the mind. The four temperaments with their characteristic phraseology have been preserved to the present day through all the mutations of physiological and psychological theories; the old form was so puissant that the new ideas had to make use of them in order to gain acceptance themselves. The power of actuality augments by simple persistence; the term becomes more and more firmly established and more and more firmly interwoven with the rest of tradition. If this tendency to persist encounters no opposition, the terms will also gradually come to form among themselves an aggregate of increasing solidity and finally become consolidated into a system; but then, despite all the resultant advantages of formal elaboration, there is a constant danger of inward torpor and a cessation of intellectual progress, whereof we have an example in the later phases of scholasticism.

Where the intellectual life is vigorous and buoyant, there is no want of counteraction by transformative forces. Where terms are part of a living tongue, the incessant though scarcely perceptible changes in the meanings of words ensure them from becoming absolutely rigid. In an unusual degree are the conditions of existence surrounding terms altered by the transference of intellectual achievements to a new language. But the stability of terms is most powerfully and frequently shaken by stupendous catastrophes and revolutions in the realm of thought, or by the shifting of the main bent of philosophy. In all such movements frequently several candidates lay claim to the same place or standing. If no intellectual compromise can be effected by a division of the domain, one must give way before the other in the fierce struggle for existence that necessarily ensues. In this way in periods of fruitful

creative activity the single systems come into hostile conflict. None can control the empire of thought unless it is successful in enforcing general acceptance for its terminology. But by the very act of achieving this victory, that is, by the very act of their passing into common speech, they lose a certain amount of their peculiar characteristics, although the loss is not total. Thus, much of the spirit of systems still abides in the terms imposed by them on the world, and their influence, although unobtrusive and recondite, is still generally noticeable and enables us to form a judgment of the measure of their success. Terms that are not accepted may persist within the school itself, but their life is severed from the general movement of thought, and their cultivation is entirely artificial.

A different kind of contest arises when the traditional phraseology of a language comes into conflict with the traditional phraseology of a foreign tongue. In a limited degree this conflict is enacted wherever one civilised nation is in contact with another. It comes to pass on a far grander scale where a large mass of intellectual achievement is transplanted totally to the soil of a new language. In such a conjuncture the continuity of tradition is broken. A sifting and winnowing of the material is imperative. Even the terms that are preserved must establish their right anew, and frequently undergo adaptive modification in respect of form. On the other hand, even after a term has asserted its initial fitness, still its position is not definitively assured; for the deeper the intellectual movement strikes root in the new soil, the more imperative is its demand for forms adapted to this new soil; new expressions are coined and act with all the fresh and vigorous potency of natural and original elements, whilst the old has all the advantages of assured position. Even when the new terms are actually advancing and on the general road to acceptance, still victory is not assured in all cases. A contest of the kind referred to was conducted by the Romans against the Greek terminology, and by the Germans against the Latin terminology of the schoolmen. The Germans had the advantage of a more opulent and flexible tongue, but the Romans presented a solider front, and better understood the method of consolidating the achievements of individuals into an organic

whole. Where two terms laid claim to the same place, not infrequently both were preserved side by side, whereupon afterwards a differentiation of ideas ensued. Originally mere outward inducements to fix the meanings of different words as regards one another have in the end frequently led to an inward and profound subtilisation of thought. As often happens in the world, an advance was here also made from without to within, and accidental circumstances aided the advancement of reason.

The inward displacement of the intellectual situation by new systems of thought must be great according as the rupture of the new with the old is abrupt and its way of stamping itself on the thought of the times is vigorous. Particularly severe will the collision be at the points where the centre of the new system is situated; for here least of all can the thinker accommodate his mind to the strange forms. At this point, consequently, either a new formation must result or the old must become adapted by inward transformation to the new conditions of life. But though every system imparts from its centre a new undulation into the sea of terminology, yet the behavior of thinkers varies greatly in this regard. One class treat the form as something unessential, in fact have a positive dread of giving a determinate form to their systems, going so far as to regard such procedure as a restriction. Such was the manner of Fichte. Others, on the other hand, cannot rest until their ideas have found full and permanent incarnation. On this question men like Plato and Leibnitz have held liberal views; Aristotle and Kant have observed a more rigorous standard. For terminology the latter are the leading spirits.

All these processes vary in intensity and pursue different courses, according as they deal with technical terms proper—terms which describe a definite subject or a definite activity, that is, define some actual matter of fact—or as they deal with terms that involve a characterisation or judgment, as, for example all party names do. Since the latter appeal in a high degree to the emotions, they are consequently subject to far more vacillation. Powerful impulses from without are not needed for shifting the situation in the case of such terms; in fact, their own development trans-

forms it of itself. These terms go through some such course of development as fashions; they annihilate themselves by a species of immanent dialectic. For a thing that springs up originally as having a special significance and as designed to mark off a definite movement from others, is, when its aim has been accomplished, appropriated by others. But the more the number of its claimants increases, the more the word comes into general circulation, the more it loses its discriminative efficacy, the more it is exhausted and worn out. Its bearers must look about them for some new expression whereby to distinguish themselves sharply and unmistakably from others. Thus its outward diffusion results in inward annihilation, and the repeated exhaustion and constant change of party names is rendered intelligible.

In glancing over the changes which the total body of terms undergoes in all these movements, a contrary direction of development is unmistakably obvious. On the one hand, there prevails a tendency for increasing minuteness of ramification and sharper differentiations, and on the other hand a desire for simplicity and for reducing systems to clear and stable fundamental lines. Where the foundations of a work persist unchanged and the construction of the edifice is quietly continued, we have always to expect increasing carefulness of elaboration and increasing exactness in the specification of the ideas of the system and consequently of its terminology. This process is displayed with special distinctness in later scholasticism. But it involves the danger, which runs hand in hand with increasing subtilisation, of losing touch with direct and living experience, and of degenerating into artificial routine. If the foundations are then attacked, there is eminent peril of the whole structure collapsing. Subsequently, and as the result thereof, the tendency arises to repudiate entirely all subtle definitions and to fix the meaning of only the most simple, the most incontestable and the most immediate notions.

This is what was done by the great thinkers of the seventeenth century, and by none more than by Spinoza. In all the crucial points of his system we find him constantly bent on exhibiting the identity of ideas which formerly were discriminated with great zeal

and assiduity ; again and again we meet in the works of this great monist the characteristic phrase, *unum et idem sunt*. On the new soil, of course, the need of discrimination subsequently again arises, and consequently the same danger may set in that it was first sought to escape. History thus offers the spectacle of successive simplification and differentiation : like Penelope it always seems to be unravelling what it has woven.

In reality, however, this stupendous movement is not without its results. At one time there remains a choice total of permanent gain ; at another there is the hope that, just as cognition is directed to true problems by the experiences gained in strife and controversy, so also in terms there is constantly brought to expression more matter of fact. Since thought is always advancing into infinite stretches ahead of it, and the means of expression also must constantly change, consequently also terminology can arrive at no final goal but must continue in constant development. We must rest satisfied that this movement is not entirely without its fruits.

II.

The foregoing considerations concerning philosophical terminology might still be developed in many different directions and in far greater detail. Furthermore, they might be brought into relationship with the general problems of language and of the latter's relation to thought. This task, however, would carry us too far, and the little that has been said is perhaps sufficient to establish the significance and fruitfulness of this province of inquiry. A wide domain of research is thrown open here which affords abundant material for study and discovery, and in addition is eminently apt to give assistance in the solution of other scientific problems. The manner in which individual thinkers, nations, and epochs give expression to their thoughts, furnishes an important contribution to the portrayal and appreciation of their character. But, most strikingly of all, the individual is more precisely appreciated, more accurately interpreted, and more distinctly comprehended in his individuality when the peculiar traits of his language are fully grasped.

We come to know in our study of terms individuals, epochs, and nations, as well in their isolated states as in their relations to one another. We recognise the influence which the work of the individual has exercised upon the collective social body. Relations which otherwise would have remained obscure rapidly lend themselves to comprehension from this point of view. Nay, even the collective spectacle of history receives by this procedure a peculiar form—in that it is made to appear less as a continuously flowing current than as a luxuriant mass of branches and foliage or as a complex and intricately woven texture. The individuality and distinctness of the results and creations are brought more visibly to the fore. By having our attention diverted from the results and fastened more particularly upon the means and conditions of the work, the elementary and individual forces involved are more apt to obtain recognition, with the result that the importance of an exact inquiry into the historical facts as distinguished from the speculative treatment of the same, is strongly emphasised, although without rendering the speculative treatment superfluous, nor in any manner dispensing with it.

But this increased importance of individuals and of individual achievements is far from resulting in segregation and waste. On the contrary, here more than elsewhere all things are mutually determined and mutually associated. Not only is the upshot of the individual's achievements parcel of the collective social body, but he himself is indissolubly linked with that body in the conditions and suppositions of his performances. In words and terms the labors of centuries flow in upon the individual; an intellectual environment receives him here with silent but powerful influences. The movement of terms exhibits history far more continuously and uninterruptedly than could possibly be observed from the struggle of ideas. Even opponents meet on this common ground and can profit by contact. Thus is demonstrated and strengthened here that treatment and view of history and sociology which forms a marked characteristic of our nineteenth century. At the same time the limitations of this view and of the influence of the collective social body are just at this point rendered manifest. Tradition is useful only

when it does not suppress the native activity of the individual. Traditional terminology aids scientific work only when it is grasped by independent thought, carefully tested, and revived. If some such opposing influence is wanting and individual power is not exerted on this subject, the heirloom of ages may be converted into a fateful burden, intellectual labor perforce will stagnate, grow formal and even erroneous. Thus history and society do not hold sway over the individual as an unavoidable destiny, but the interaction, or, as we might say, the struggle of individuals with the collective body, of the present with the past, is the fountain-head of all true life.

But inquiry into terminology is not only the condition of intimate and fruitful contact with history, it can also directly promote the work of philosophy itself. Concerning the dangers of obscure language, concerning the disadvantages of changing and ambiguous expressions, there can be no doubt. But it is far easier to complain of such conditions than to devise means for removing them. Yet unquestionably such a means, such a solid *point d'appui*, is offered by the illumination which historical research sheds on the character of terms. The constraint here exercised induces us to deal more seriously with terms and to insist upon precise significations. The historical pursuit of a term from the time of its origin to the present cannot help making it more transparent; things that lie hidden and often fused in our present stock of variant meanings, things therein that are merely the echoes of former phases of existence, are all detached and set off in single definiteness by this genetic mode of consideration. The conditions and suppositions of the present become clearer to us. By the injection of new life into the term the idea receives greater precision. Lastly, we also gain in our own work on understanding how the created has sprung from the creating.

The opinion is not infrequently advanced that all controversy in philosophy is simply a result of misunderstandings and that agreement in the matter of words would also bring about agreement in the matter of things. So thought most of the thinkers of the seventeenth century, including Descartes and Spinoza. But Kant

repudiated the view with much vehemence. To him the work of philosophy appeared to involve too many antinomies of fact to warrant any hope of composing them by a mere clarification of language. Unquestionably, Kant is right on this point; but if this method is not able to establish complete peace in philosophy, it is certainly a powerful enemy of all unnecessary controversy. Inasmuch as a clarification of verbal expression lessens the number of purely verbal disputes, all the more time and strength can be expended upon real problems and genuine inconsistencies; and that is certainly much. It was a pretty *mot* of Kuno Fischer that true problems are true thoughts. When its energies are applied to true problems, philosophy will bear richer fruits, and we may cherish the hope of its promoting the advancement of the whole even by the very struggles and conflicts which it involves.

III.

A province of scientific inquiry which offers such a plenitude of material and bears on such important questions, and whose bent and character harmonises with such powerful intellectual movements of our time, should arouse much interest and also much activity. The more so as ever since the beginning of modern philosophy the import of scientific terms has been incessantly forced into notice, and principally by English inquirers, from Bacon and Locke down to Whewell and Mill. If the tendency to treat history exactly is added, we have all the conditions of a progressive development. In fact, much interest is taken and much labor is being expended in this direction, and the attention of thinkers has been sharpened for the questions involved, both in the portraiture of great inquirers and in the editing of their works. More notice is being paid to the subject of terminology, while there is a distinct increase in the number of monographs on important single terms. But with all its individual achievements the state of the province as a whole is far from satisfactory. There is a lack of concentration, of organisation, embracing and holding together the scattered results and guarding the laborers against a useless waste of effort; and the

reason of this lack is solely that questions are treated incidentally and supplementarily, which can be brought into inward and outward connexion only by being independently elaborated and by being made an end in themselves.

It has been the fundamental idea of our inquiry that the term as a union of idea and word possesses a peculiar character and has shared peculiar fortunes. If this view be correct, then terminology must take a place apart and become an independent discipline within the domain of philosophy, and the branches of research bearing upon it must converge and be formed into an intimately connected whole. But this can never be accomplished from detached and isolated points of attack, but demands the protective oversight of some common organising head, such as can only be found in some learned body, academy, or university. Such a body should undertake the compilation of a large thesaurus of terms, on which, in view of the prodigious mass of materials and their vast ramifications, innumerable scholars should be set to work. An archive for terminology would have to prepare the way for and support this undertaking. Having thus obtained a secure foundation, not only would all individual labor be rendered easier and more productive, but an abridged philosophical dictionary could be compiled for the needs of educated people generally. Many are forced to dispense with such a work at great intellectual cost and sorrow, and besides such a dictionary would augment not a little the influence of philosophy on common life. A vast and difficult task, but one which bids fair to yield much fruit.

The organisation absolutely necessary to this end, I have for many years repeatedly recommended in Germany, and have also sought to create an interest for the project by special treatises.¹ Of assenting voices among individual colleagues there has been no lack,—latterly Dr. Schmidkunz of Munich has taken up the cause, —but nowhere has the organisation been set on foot, and so far as I

¹*Geschichte der philosophischen Terminologie im Umriss*, 1879; *Parteien und Parteienamen in der Philosophie* (in *Beiträge zur Geschichte der neuern Philosophie*, 1886.)

know there is nowhere hope of it. Here, therefore, is a chance and a task awaiting America, where there is no lack of scholarship, talent for organisation, nor of readiness to make sacrifices. American scientists have proved themselves by their work in other fields to be the peers of the scholars of the Old World; why, therefore, should they not undertake the leadership in this new branch which treats of the history and development of the language of philosophy?

RUDOLF EUCKEN.

JENA.

ON THE ORIGIN AND IMPORT OF THE IDEA OF CAUSALITY.¹

MORE than a hundred and fifty years have elapsed since David Hume, in his critical inquiries concerning the human understanding, subjected to exhaustive scrutiny the idea of causality. The impoverishment of this idea, the restriction of its meaning which Hume's analysis proclaimed, reposed on a peculiar view of the genesis of this notion. This latter study had since Locke been regarded as the safest method of establishing the epistemological value of ideas. The epistemological value of an idea is determined by the amount of reality entering the idea. Reality is synonymous with that which may be made the subject of direct experience, with that which is perceived, and not with that which is represented or thought,—in fine, with what Hume called *impression* as distinguished from *idea*. And every critical examination of ideas necessarily goes back in the end to the question: What definite experiences, what impressions lie at the bottom of them? Hume, as we know, subjected to the test of this logical reagent a large number of ideas, and with regard to all of them came to the same sceptical conclusion,—that in the popular as well as in the scientific usage these ideas had far more intellectual contents than could be warranted by their actual cognitive or experiential elements, and consequently that this surplus was more a product of imagination than of reason, more fancy than knowledge.

Of all the ideas which Hume investigated, that of causality is unquestionably the most important. It is the cardinal notion in

¹ Translated from Professor Jodl's manuscript by Thomas J. McCormack.

the comprehension and arrangement of all the changes which we experience—a leading concept both in the physical and in the mental sciences. Our whole scientific world-view is determined by the meaning we give to it. Precisely at this point, moreover, has the influence of Hume's criticism been particularly lasting. Both science and philosophy have bowed to his arguments, and, so, have lapsed into a species of habitual scepticism for which in the nature of the case there was no real foundation. The irrefutability of Hume has grown into a virtual dogma, and it will doubtless repay the trouble, as it generally does in such cases, to submit this dogma to searching and exact analysis.

According to the notion of causality, as it was commonly accepted in the popular and scientific thought of Hume's time, a change occurring in nature was interpreted as having its origin in an antecedent change or motion connected therewith in time, as being effected by its antecedent, or as being *necessarily* conjoined with it. On the basis of his analysis now, Hume excludes from the contents of this idea all connexion among the things themselves, all objective connexion, as also the necessity of such connexion; he leaves nothing standing but a connexion of ideas and the *feeling* of a certain necessity in this connexion, that is, a subjective connexion. Causality, says Hume, implies no connexion of things, for this would require that some special perception should be given us of the bond which links two phenomena together. But nothing of this sort has ever been observed. The impressions on the basis of which we causally connect two phenomena never present anything more than regular succession. Nor does causality involve connexion by virtue of the contents of the conjoined ideas, somewhat as we are able to develop a system of geometrical properties from the ideas of the circle, radius, and tangent. There is no logical connexion involved. For no one can infer from the idea of a thing what its effects must be, or what it has been the effect of. Our causal judgments are dependent entirely on experience. But this furnishes us with nothing but regular succession, and this alone gives rise to the so-called necessity of causal connexion, which is merely a habit or propensity of our imagination to associate regularly succeeding ideas, to pass

from the one to the other, to expect or to foretell from the one the other.

So much for the sceptical arguments of Hume. Of their extraordinary influence I have already spoken. The entire Kantian philosophy, wherever its influence reaches, is almost completely dominated by them. Neither Kant nor his followers ever ventured to assert in contravention of Hume that causality could imply a necessary connexion in the objective world. Their sole makeshift was the ennobling, I might say, of what was substituted for this objective connexion. They made out of a habit of the imagination, out of a law of association, a primitive and original function of the understanding—a category. But it is clear that this statement of the problem of knowledge is in no essential point an advance on Hume. For the word *knowledge* bears its right meaning only when what is so called produces in us a consciousness of objective relations. But universal subjectivity is not the same as objectivity. An order of things proceeding *solely* from innate functions of the mind would be a conceptual architectonic figment, possibly of great rigidity and regularity,—a system of necessary illusions of the race, but not knowledge. It is a matter of course that all knowledge is partly mediated by consciousness, is a joint action of the ego and the non-ego. Absolute knowledge—that is, such as would be at the same time the thing itself—does not exist. All knowledge is a blending, a unification of the ideal and the real.

But not only Kant and Kantians of all shades down to Fr. A. Lange and Fr. Zöllner have surrendered unconditionally to Hume. H. Lotze also advances substantially the same ideas and teaches the doctrine of the unessential character of all causal relations for thought and the impossibility of discovering a bond between cause and effect. And when he attempts to overcome this isolation of the single elements of the world by assuming that they are all members of a single being and unitary substance, surely this is equivalent to seeking in remote metaphysical cloudlands truths which lie unnoticed at our feet. For inasmuch as all things in the world are far from being causally connected with all other things but in all cases definite effects only are dependent on definite

causes, therefore the substantial unity of the world cannot enlighten us regarding the validity of our causal judgments and their epistemological value—but in reality the connexion sought is to be found in more proximate regions, namely, in the order and happenings of the actual world.

For certainly—to set the matter at once aright—the truth does not lie in the direction indicated by Kant, nor by Kantianism and the idealistic metaphysics. This line of thought, far from leading away from scepticism, actually plunges thinkers deeper and deeper into it, finally landing them by a perfectly intelligible reversion in mysticism. The truth does reside in empiricism, but it requires for its discovery a more searching examination of experience. The empiricism of Hume is not too much empirical but too little empirical. His description of the facts of experience is not exact enough. He jumps too frequently to constructions. I shall now set about demonstrating my assertions in detail.

Hume had asked in what fact of immediate experience, in what impression is the connexion between two phenomena given which we have in mind when we say that they are causally united. He had answered, there is no such impression. The phenomena, or the ideas representing them, are absolutely distinct; there is no bridge leading from the one to the other, except that of custom. The causal law is nothing but the law of our psychological mechanism.

Is this a perfectly exact and apposite description of the facts? Whoever replies in the affirmative is irrevocably a captive of Hume's reasoning and can escape his conclusions in appearance only, or by extremely artificial devices. It is my belief, however, that this question must be answered in the negative. Misled by certain prejudices of the philosophy of his time, Hume did not rightly envisage the facts which led to his theory. What were those prejudices? Locke in his examination of the human understanding proceeded from an assumption which also thoroughly dominates Hume's inquiry: that the original, *actual* path of development of consciousness was the same as that of psychological analysis, only contrary in direction. Psychological analysis dissects the contents

of consciousness, separates the individual phenomena from one another, and endeavors to apprehend their simplest and most primitive forms of appearance. No one will deny the value of such inquiries, nor of the profound vistas which they afford into the hidden mechanism of consciousness. But psychological and epistemological methods are not identical, no more than are anatomical and embryological.

The blending of these two problems is characteristic of the entire period of criticism to which Hume belongs. It was thought that the epistemological problem could be solved by undertaking a synthetic construction of the contents of consciousness from the elementary facts which psychological analysis had revealed. It was supposed that what was simple and ultimate in a psychological regard was also adequate to explain our perceptual and intellectual complexes. This is tantamount to asserting that a knowledge of the chemical constitution of a body is able to furnish us with a direct sensuous picture of that body. It would be the same as if an anatomist after singly studying and depicting the myriad parts of an organism should form a new synthesis of them and imagine he had apprehended in so doing the secret of life. Consciousness is an organism like the living body; not a mosaic that can be taken apart and then rebuilt from its elements on the same plan. In fact, we must go a step further and say, the simple, the elementary is never a datum, but is an abstraction—not a thing experienced but a thing thought. In actual experience, apart from all psychological reflexion, the elementary, or what Locke calls "simple ideas," never occurs. In point of fact, we have experience only of complexes, complexes of sensations of varying qualities and modalities, combinations of motions with sensations, combinations of sensation and motion with feelings and volitions—complexes in which some of the individual constituents suffer change and modification whilst others remain unmodified. These complexes are the original data of consciousness. We renounce all possibility of insight into the real foundations and epistemological value of our ideas if we regard these complexes or syntheses as the subsequent products of conscious activity whose origin from isolated elements is in need of

some additional explanatory principle. This is a complete inversion of the situation and involves us in struggles with difficulties of which we ourselves are the creators.

That unification, that complexus which makes of a group of sensations a "thing"; that complexus which presents a causal relation—that is the simple original element for the non-reflecting consciousness. The separation of its constituent parts, the analysis of the complex into its elements is a work of thought, of abstraction. There is never in consciousness absolutely unformed matter, a raw material of sensation on which the mind imposes form from its own exclusive stores—for the simple reason that in the world which our sensations reflect no such thing exists. The ideas of matter and form are here as everywhere altogether relative. Thus also pure formal thought cannot be in consciousness entirely before experience, making possible experience itself; but consciousness by the exercise of reflective thought picks out from the unanalysed contents of experience what the early critical philosophy called ideas of form or *Stammbegriffe*. If these were not immediately contained in original data of experience, we could never arrive at knowledge by means of them, but at best could perform constructions. Hence the question regarding the bond which knits together our perceptual complexes, or regarding the source from which the form of our sensations springs, can only be understood from the point of view of a matured reflexion to which for some reason or other the immediate data of experience have been made the subject of doubt. The simple man, the man of early stages of civilisation, the adolescent man, would not grasp the question at all—it is extremely difficult even to make him understand what it means. For the perceptions by which formal conceptions, say the idea of cause and effect, are awakened in him are not distinct, detached, and isolated perceptions, but a complex of perceptions of which one always stands to the others in a relation of contiguity, of which one passes into the other or is transformed into it, and which for him, therefore, are not separated but belong together and form a whole.

The contents of the notion of causality in the natural conscious-

ness, therefore, is something more than and different from what it is in Hume's explanation. Even the non-scientific consciousness discriminates quite readily between the inward compulsion of an association and the outward necessity of a relation of causality. Not everything that constitutes by reason of regular succession an association, a propensity to pass from one thing to another, is conceived as causally connected—a distinct proof that in Hume's explanation all the contents of the idea have not attained their full expression.

This explanation exhibits a surprising similarity to the exposition which a movement in modern psychology, resting on allied fundamental views and which is often also termed empiricism, has given of the origin of the perception of space. This psychological empiricism has attempted the feat of showing how spatial character can be imparted by sensations of movement to contents of sensation to which originally the spatial quality was wanting. But the muscular sensations of the moving eyeball could never engender the optical intuition of space unless the sight-sensations had from the beginning been definitely arranged and fixed in visual space—they can only give greater distinctness to this originally incomplete arrangement.

No more can habitual connexions of two objects or ideas through a relation of sequence produce the true notion of causality, as the general consciousness of mankind employs it, although as we shall see, in this notion regularity of temporal succession also forms a factor and that no inconsiderable one.

But the deepest root of the notion of causality has not yet been disclosed in the preceding considerations. So far, we have only marked out in the path trodden by Hume the place where this acute thinker strayed from the right trail. The natural complexus of sensations which we were constrained to substitute for simple ideas as the real epistemological element, is not of itself sufficient for our purposes. Natural complexes of perception also lie at the foundation of the notion of thing, of the notion of substance, of the notion of space and time, of the notion of the ego and the non-ego. The question is what additional elements must be contained in such

a complex in order to engender the notion of causality, or, what is the same thing, to make the members conjoined in such a complex appear as cause and effect.

Our purpose may be made plainer if we reflect that man is not only a representing but also a willing being ; not only passive but also active ; that not only do the images of the world pass before his mental vision, but that he has also the consciousness of action, of interference, of independent creation, and of being a cause himself. In the notion of causality, as was said above, every one has in mind the notion of a change which has been effected or occasioned by an antecedent. Can it be, that the type of this idea is really so inapprehensible? Are we to think that all the changes in the objective world which emanate from the ego, as when we change the position of a thing, take something into our hand or throw it away, when we put food into our mouths, make something, or divide something, or put something together, when we make something sound or vibrate—that all these processes or changes in the objective world are not to be conceived as having been produced by the ego? Volition, motion, the feeling of force, change in the world of objects—which for the very reason that we are successively aware of them as conforming to the manner and direction of our motion and with the measure of our power, appear as an equivalent or as a transformation of our motion—here we have a complexus of perceptions, no member of which is isolated and distinct from the rest, but which are involved in continuous and constant transitions, exhibit partly spatial, partly temporal contiguity, which form an indiscerptible totality, and from which the individual factors can be disengaged only by extremely mature reflexion. But reflexion of this kind is foreign to the ingenuous man. Since not a shade of doubt prevails in his mind concerning the connexion of his movements with his power and will, and again concerning the connexion of a movement willed by him with the results accomplished before his eyes: consequently this event becomes for him in its entirety the type and exemplar of causality.

Effect, “effected,” is that which one endowed with power makes, creates, or shapes by means of this his power. This is the real

root of the notion of causality as man fashioned it previously to all science and theory of knowledge, through intimate contact with his needs and his abilities, and consequently with his instinct of self-preservation. Let us picture to ourselves but for a moment the importance for man of the changes produced in the outward world through his initiative power,—the slaying of enemies, of beasts of prey, the felling of trees, the manufacture of weapons, tools, utensils, the production of fire, etc.,—and we shall no longer be tempted to doubt that the strong impression which this relation must have made on consciousness was the first and most original source whence the notion of producing effects, of causal connexion sprang.

It has been held that we must dig deeper in order to lay bare the true root of the notion of causality, and that for this purpose reference must be had to certain phenomena of inward experience—the following of a conclusion from its premises, the desiring of means for the sake of the end that can be reached by the means. Here and only here, is necessary connexion, inward conjunction, effectedness, absolutely evident. We are concerned here, according to the unequivocal declarations of inward experience, not with habitual succession, but with genuine causation. Now unquestionably it must be granted that the connexion of these psychical processes answers perfectly to the notion of causality as that takes shape after a rigorous epistemological and critical elaboration. They are perfect types of psychical causation. But whatever services they may render in a logical or epistemological examination of the idea of causality, they are totally unqualified to supply the genetic foundations of this idea.

All development of consciousness proceeds from without to within. Man, in his earlier stages totally naïve and absolutely abandoned to the contemplation of objective things, learns only very gradually the art of scrutinising inward processes. Things interest him, not the consciousness of things; the way things hang together, and not the way consciousness acts. The discovery of mind in his inner life must be relegated without exception to a subsequent stage. It is putting the cart before the horse to make the connexion of purely psychical phenomena the prototype of causal-

ity, the key to the changes of the outer world and the key to the understanding of what is effected by our will, by our power. Man is wont to take little notice of the formal character of these psychical processes, for the reason that he is concerned only with the result and its practical utility. The thought which flows from given assumptions, the willing of the means for the sake of the end, exist, by the sheer power of the psychical mechanism, merely and always when the appropriate conditions are given; but the mediating process itself is never made the object of search. Remotest of all, however, from the unspeculative mind is the idea of comparing these psychical mediations with the momentous changes which we produce in the outer world. So remote, in fact, that not even Hume, although he regarded many causal relations between psychical processes as something self-evident, e. g., the influence on ideas of the corresponding impressions, the production of belief and of passions by prospective events,—that even he never hit upon the possibility that the typical form for the connexion of events in outward reality inhered in the above adduced connexions between psychical processes, although he unquestionably recognised these as real.

Thus, the behavior of one of the acutest of analytical thinkers, Hume, proves how artificial and far-fetched is the attempt made by some modern psychologists to derive the notion of causality from purely psychical processes. Conversely, the history of the development of human thought proves, that the genesis here given of the notion is not a mere logical creation. Mythological thought—the first form in which man sought to rationalise the surrounding world of phenomena—shows that the experience of personal creation, personal activity, is the prototype of causality; that those transformations in the world which man himself does not produce, are first rendered intelligible upon his assuming the presence of acting Beings within them. The circumstance is also to be marked that these beings—the gods and demigods of all ranks and degrees—have never been perceived; and that consequently the human imagination had to execute here a difficult construction, had to perform a genuine act of creation in order to arrive at these mental fictions with which the intellectual history of all peoples, the crud-

est as well as the most gifted, teems. This circumstance itself proves that the root of the notion of causality cannot reside in the alleged psychical connexions. For, if the natural model of the notion of causality were really contained in these experiences of inward perception,—can it be imagined that human reason, whilst possessing such an implement for constructing and interpreting the connexions of natural changes, could have lighted at all on the expedient of personification? Obviously, there is but one reason why the mythological habit of thought arose and established itself, and that is because no other connexion between results effected and the agent effecting them is primitively intelligible, except that where the effecting agent appears as the will and power of a person. Is the idea of God aught else in the minds of most people than the largest and hugest product of this naïve instinct of causality, which never rests satisfied until it is thrown back upon personal action and creation?

And as a further proof that we are on the right track here, attention may be drawn to the fact that even where the idea of personal action has receded into the background, there is still a fair portion preserved of this ancient, I might almost say paleontological, notion of causality,—a portion the mere announcement of whose name is sufficient to bring home to every one its tremendous significance for human thought and its connexion with the idea of personal activity. I refer to the notion of force. No one will deny that we have derived this notion from self-perception,—whether from the force which we ourselves as willing persons exert, in order to do or accomplish something, or to produce certain changes; or from the impressions which we receive when outside things act on us. Whether active or passive, we are conscious of forces—now of our own force, now of outside force. And on the basis of this immediate experience we interpret as activity and passivity all those processes in the surrounding world in which we personally are not concerned in either of these forms. It is plain that force, too, is nothing but a weakened mythological personification. It is plain that a phenomenon is no more explained on tracing it back to a force than if we had traced it back to a deity. The ideas

which accompany the thinking of the notion force are at best but an abridged expression of the facts themselves, of definite quantities of motion at definite points of the physical world. But the enormous diffusion and use of this notion in the thought and language of mankind, which even the terminology of science has not been able to avoid, affords a proof of how difficult it is for us to conceive of action and change in any other way than under the guise of activity and passivity, of a force that is exerted or of a force that is sustained. But this is the formula which in our immediate perception connects the changes of the outward world.

Here, too, it would be quite unintelligible how humanity had reached this mythology of the notion of force, which forms a well-rounded counterpart to the mythology of the gods, if the explanation of an otherwise unintelligible regular connexion between two phenomena had not appeared clear to it in these experiences, and if the psychological root of the notion of causality did not reside here, especially as regards the aspect of necessary connexion. For naïve thought, certainly, cherishes no doubt that if something is traced back to a definite force or exhibition of force on the part of something else, then that result necessarily follows—no more than it would for a moment cherish a doubt as to the necessity of the effects which are produced by its own displays of force.

Of course the phenomena which are to be explained by the notion of force must have a sort of resemblance to the changes which we ourselves produce; since otherwise the latter could not be used for their explanation. That is to say, they must succeed one another with the same regularity that certain modifications in the world follow upon the setting into activity of our representative or volitional powers, or upon our bodily movements, and we must be in a position to get some sort of direct view of the transformations, of the passing of one phenomenon into another, by the addition of some second thing. Where this for some reason or other is impossible, the naïve human being, the moment some modification appears to him of sufficient importance to be made the object of thought, again has recourse to mythology, and the activity of mysterious, invisible, personal beings is once more employed as a

means of explanation, revealing the true and primitive root of causality.

We revert here to the factor of regular succession. By itself it is far from sufficient for engendering the notion of causality, yet it is proportionately indispensable in accounting for the rise of the same. Every regular succession produces an association of ideas, and the latter gives rise to an inclination to pass from the one idea to the other, or, when the one is given, to add the other in thought. But connexion by causality is a special case of the general form of connexion of ideas by succession. What it needs is a direct intuitive view of the transformation, and of the mode of emanation of things from one another, a direct and actual perception of the propagation of one state or property into something different. In a word: in and with the succession is given coincidentally the impression of coexistence and of contiguity, and this by virtue of the above-explained analogy with the results of our own action furnishes the foundation of our idea of things as being caused by, or due to, one another in addition to the fact of their following upon one another.

Now it is a frequent saying—Hume said it and countless others have said it after him—that in no case can we have a perception of this. This sceptical assertion, however, transfers doubts of a matured scientific frame of mind to the original construction of the idea. The common man would be quite astonished if we said to him he had no knowledge of the connexion, of the transformation which exists between fire and the production of heat, glowing, and burning, or which exists between nourishment and a certain degree of strength of body, between hunger and weakness, between rain and the prospering of plants, between generation and birth, between a blow, a wound, and death. We have only to reflect on what different demands exist for evidence or intuitive knowledge according to the degree of intellectual development. Things that appear quite natural and palpable to a simple mind offer the most perplexing riddles to developed thought. Man's appreciation of the continuity of a given connexion of things has many gradations from the most superficial and crudest to the microscopically fine and mathematically exact. That fire is the cause of the burning of ob-

jects with which it is brought in contact, that it "consumes" them as a man does a meal, was perhaps never seriously doubted by any one that was not a philosopher, nor ever held by any one for a habitual connexion of two impressions which have objectively nothing to do with each other. But connexion is not in all stages the same, nor is vivid and palpable intuition always the same. For primitive man the fire-myth was vivid and palpable; as was also for the beginning of scientific thought the theory of phlogiston—a substance supposed to be contained in certain bodies rendering them inflammable and which could be consumed by fire. For the way of looking at things which then obtained, this conception was vivid enough and remained so until new observations destroyed its palpable character and showed that burning was not a consuming of matter but an absorption and different distribution of matter, and until scientists finally got to understand the various possible rearrangements of matter and the relation of generated heat thereto. Starting from this first fundamental insight into the transformative relations of natural processes, a succession of other thoughts subsequently arose which began to remodel entirely the relation of cause and effect as it had been hitherto understood. It was disclosed, that a cause really produces nothing, makes nothing, engenders nothing, but only gives rise to re-arrangement or transformation; that between two processes which subsist in the relation of cause and effect an invariable relation of equivalence obtains which is constantly under exact control; that in all so-called becoming there is actually nothing produced but simply something transformed or rearranged, and likewise that in all apparent disappearance nothing really disappears but a definite form, a definite disposition and arrangement of the elements of reality.

From these ideas the modern scientific notion of causality has sprung. The doubts of Hume do not apply to this notion. Hume required of the notion of causality, on the ground of its involving the element of necessity, that it should exhibit in the *single* impressions the force which bound together cause and effect. To-day we can say that this is a complete miscomprehension. Whence could this isolated force of connexion be derived which is supposed

to operate like a *Deus ex machina* between two things which by themselves have nothing to do with each other? The "cause" is force and the "effect" is force; and what is styled the causal relation is the fact that two forces are able when in contact to become transformed. This is not accomplished by means of a special force, but it is nothing else than the fact of transformation itself as related to the joint action of two forces. And this also offers us a simple explanation of why in some cases a single observation is sufficient to ascertain the existence of a causal relation between two phenomena—*videlicet*, in cases where the transformation of one phenomenon into another and the relation of equivalence between two forms of force can be rendered in some way evident and palpable; whilst in other cases hundreds of observations and the utmost regularity of succession are inadequate to this end, for the reason that it is impossible to establish that palpableness of transformation which can alone justify the employment of the notion of causality.

Scientific cognition when it asks for the causes of things is in quest of nothing but this evident and palpable connexion in which the properties of two things are mutually transformed when brought into contact. The simpler classes of these connexions are to-day quite clear to us, and the effort of science is now none other than to reduce also the most highly complicated of these connexions, such as the phenomena of life and of organic modification, to simple and immediately evident transformations. Even here the naïve conception of causality which reigned in olden times and which was characterised by the two concepts of creation and vital force or *nisus formativus*, has already begun to give way to a growing comprehension of the true connexions of this field. The history of the evolution of the plant and animal kingdoms enables us to understand the present world of organisms as the result of a long succession of transformations of organic forms throughout countless generations. For the mysterious and uncomprehended causality of creational acts has been substituted a knowledge of the chain of modifications and persistent states which have made of the developing organic world what it is—a knowledge which even now, as the outcome of an infinite aggregation of facts furnished by zoölogy, botany, and

paleontology, has acquired almost irresistible distinctness and cogency.

Evolution explains the existence, the adaptiveness, and the astonishing functions of existing organisms by the summation of minute new-formations, which fundamental living forms have assumed through constant contact with their physical environment, and also renders intelligible a large number of these transformations by pointing to the particular circumstances which occasioned them. Physiology has arrived at the explanation of the large by the small on the same road through its discovery of the cell, or the organic element proper, which leads a life of its own wherein all the vital functions can be studied in miniature. We know that the individual animal, which we are accustomed to regard as a unit, is yet at bottom a multiplicity and constitutes a cellular colony, and that the functions of the single organs like those of the animal entire, are produced by the summation of the activities of countless cells. The old physiology sought to explain the actions of organisms, the character of whose transformations were as yet not understood, by the crude notion of vital force, precisely as the Ptolemaic astronomy assumed a special *spiritus rector* for each planet—all unmistakable indications of the true origin of the idea of causality. To-day the notion of vital force, as an empty mythological phantom, has in this department also been displaced by the notion of transformation. It is becoming more and more forcibly evident in matters of detail that the organism is nothing but an extremely complicated piece of machinery which under favorable conditions regulates itself. By its specially developed power of storing up potential energy in large quantities and of transforming the same again on slight excitations into kinetic energy, it awakens the false impression that it produces force from itself without the transformation of other force. But on closer examination it is found that the transformative process can be followed step for step; for in the organism, too, that invariable relation of equivalence between the different forms of force holds good which forms in a scientific sense the type of causality.

The employment of the notion of causality in human thought

shows, therefore, a progressive development. Starting from the analogy of natural growth and annihilation with human action and creation, it appears everywhere founded on the existence of a definite connexion between two phenomena or changes which in some manner has been rendered palpably evident. The apprehension of this connexion, however, runs through all stages from the purely empirical to the rational, and from the inductive to the deductive. The contrast between mathematics and the sciences of fact which Hume pointed to, is not an absolute but a relative and graduated contrast. If it were absolute it would be unintelligible how we can make use of mathematics as a help in the study of physical things, but as this is instinctively done and with great profit to knowledge, profound analogies must exist between mathematical forms and the elements of reality, or, in other words, reality must involve rationality. On the other hand, the history of science teaches that matters of fact are always and everywhere the prime necessity,—and that even in mathematics. All elementary propositions of mathematics were first discovered as facts, that is, empirically observed, before they were deduced from axioms or were shown to be necessary. The same thing has happened with mechanics. Mechanics was originally a purely empirical science; to-day it has entered the realm of mathematics as a pure science. From the notions of force, gravitation, *vis viva*, mass, point of application, direction and velocity of motion, modern mechanics has developed a complexus of necessary truths concerning all possible forms of motion, and by means of the same physics has been rationalised throughout its whole extent,—that is, our physical knowledge, the connexions of physical phenomena, which originally possessed only a necessity of fact and were entirely empirical in character, have been converted into a body of knowledge which is linked together by the inward necessity of rational evidence and logical transparency. Chemistry pursued the same course. The bare empiricism of the old atomic theory which had been built up upon quantitative analysis and on ratios of weight and mixtures, is also beginning to give way before a deductive mode of treatment which attempts to deduce what were formerly only facts conjoined by empirical necessity, from funda

mental assumptions involving spatial and mechanical data—from varying densities, heterogeneous occupation of space and irregular concentration of masses. And how long will it be before the bio-chemistry of the cell likewise will explain the present empirical fact of growth and modification of forms in all its inward necessity, from the constitution and *modus operandi* of the materials imbedded in the fundamental forms of organised matter?

The immanent necessity of logical evidence is for the modern mode of view in no respect something that is restricted to geometry, as Hume contended. It is simply most easily reached there, and consequently was earliest reached there. But we cannot make a thing that is the fruit of ages, viz., the notion of the necessity of causality in the above-discussed sense, the starting-point of the developmental process. We do have a development, but it is in the contrary direction,—the necessity which was originally only a necessity of fact is constantly raised in provinces of increasing extent to exclusively inward necessity. The problems of knowledge are solved when all provinces of action and of becoming are apprehended in their inward necessity.

FR. JODL.

PRAGUE.

SCIENCE AND FAITH.¹

II. INTRODUCTION TO MAN AS A MEMBER OF SOCIETY.

MAN, as scattered over the surface of the globe in clans, tribes, and peoples, forms the subject of ethnical anthropology or ethnology, just as man viewed as an animal forms the subject of anthropology proper or zoological anthropology. United politically under one flag these groups take the name of nations or nationalities. Viewed as to their modes of thinking and their methods of satisfying their wants they bear the name of civilisations. Considered in the relations which individuals bear to the group as a totality they bear the designation of societies. Sociology is the science which treats of societies. There is an animal sociology and a human sociology.

Conformably to the principle laid down in our preceding article,² that man is merely one of the exalted, or rather the most exalted, of the forms of animal life, and that the laws which regulate his existence, the phenomena which he exhibits, and the organs which constitute his being are, *in form and degree approximately*, but the application, repetition, and development of those which we meet with in the different stages of animal evolution, we shall commence with animal sociology. This part, accordingly, will form a transition to a third and last in which we shall treat man as a member of society. It will enable us to dwell at length on certain points

¹ Translated from Dr. Topinard's MS. by Thomas J. McCormack.

² *The Monist*, Vol. VI., No. 1, October, 1895, p. 28.

which we were obliged to curtail in the preceding article. We shall divide it into three chapters: (1) preliminary biological data; (2) the animal family; (3) animal societies.¹

I. PRELIMINARY BIOLOGICAL DATA.

Life reduced to its simplest expression is the resultant of an *ensemble* of properties or operations of a peculiar species of substance called protoplasm, which impregnates all the parts of organisms and which we meet with in the isolated state only in moners. The four first properties which must be signalised are: (1) the *oxidation* of protoplasm, which is the source of its energy or stock of vital power; (2) *excitability* or *reflexibility*, which gives rise to its actions and is the intermittent cause of its loss of energy; (3) *nutrition*, which maintains the integrity of the protoplasm and is the cause of its increase; (4) *reproduction*, which supervenes when the augmentation has reached a certain limit. The result, as regards the protoplasm, may be summed up in two words: *life* as an individual during a certain period of time, and indefinite *perpetuation* in forms similar to itself. M. Delâge adds a third characterisation: the performance of *work*. These four properties, viewed alone, are physico-chemical in character. If a particle of matter, for example, comes within reach of a moner, an excitation takes place. If the particle is nutrient in character, the pseudopods of the moner will be extended, its cilia will be set in motion, and the nutrient particle will be engulfed. There is nothing mystical in this performance. A property merely is put into play—a reaction succeeding an excitation. At most we might say that the centrosome acted as the centre of attraction.

But reduced to their ultimate properties protoplasmic substances are simply inert bodies—admirably constructed machines operating in an analogous manner but without coal or actual materials to work upon. Their impulse and direction are furnished by outward stimuli. They are constrained to respond to the commands

¹ The first two of these chapters constitute the article in the present *Monist*. The third will appear in October, and the concluding *part* in 1897.

imposed upon them, to put themselves in harmony with stimuli offered, in a word, to obey the exactions of their environment agreeably to the law of necessity, and on pain of death to accommodate themselves to the conditions of existence in which their lot is cast. Hence results a fifth property of protoplasm—that of *adaptation*. Three factors unite in insuring the perfect action of this property. (1) The plasticity of protoplasm, the result of the joint action of its reflexivity and nutrition; (2) its slight variations, with the consequent chance of modification; and (3) its capacity for transmitting new peculiarities. A word as to the first two of these. Simple and regular as the vital acts of protoplasm *per se* may be, they involve nevertheless more or less perceptible differences. Nutrition has its irregularities. The nutrient particles are not always seized and ingested at equal intervals of time nor always on the same side. The elaborated products are not always disposed with perfect uniformity from the circumference to the centre. *Variability* thus appears a primitive property. As to transmission, or *heredity*, it is involved in the fact of the reproduction of individuals like the parent protoplasm, as it exists at the moment. Thus we have another primitive property.

Nor is this all. From the union of all these properties, now numbering seven, but more particularly from the growth of the protoplasm, from its repeated reproduction or multiplication, and from its adaptation, results not the last, but the most fecund and the most general, of the primitive properties of protoplasm—its power of indefinite development, that is evolution.

Evolution! Without which living beings on our planet would never perhaps have emerged from the unicellular state, and which has caused the growth from the protists, of the vegetable and animal kingdoms, and of the vertebrates and man; titanic power always in action, always alert, profiting by the least circumstance, yet whimsical, capricious, seemingly groping and without set purpose,¹ em-

¹ The sole objection to this manner of conceiving evolution is that which I have already set forth in my *Elements of General Anthropology*. Certain organs, or arrangements of organs, certain functions are alike, or are developed in the same direction, in different branches of the animal tree, although the common trunk from

ploying the most insignificant means and neglecting at times the most direct, pursuing different lines in its advance, curved lines, straight lines, crooked lines, parallels, divergents, yet frequently arriving at the same result, limited only by absolute impossibility for the time being, having but one guide, that which is good and directly useful to the individual, and but one sanction, success! Was not that what the divine author of Genesis strove to express when recounting how the heavens and the earth and the plants and the animals had been created, he stopped at each stage, and before continuing said: "And God saw that it was good."

The first results of evolution affect the interior of the protoplasm. Granulations, a nucleus in the vicinity of the centrosome, one or several vacuoles, perhaps filaments, make their appearance there. The moner has become an amoeba, which is classified as a protozoön or a protophyte, according as it leans towards the animal or towards the vegetable kingdom. Some years ago a considerable group of homogeneous protoplasmic bodies without nuclei were supposed to exist; but the increasing power of microscopes has steadily reduced the number of these, and we are now constrained to conclude that few primitive protoplasmic bodies have come down to us. The following effects of evolution relate to the exterior: the pseudopods, the cilia, the vibratile filaments, the various irradiations, the more or less viscid envelopes, and even the calcareous or silicious teguments, which other divisions of the kingdom of protists present.

But the decisive stage in this distant epoch of the history of the animal kingdom is that which turns to account a final and hitherto latent property of the protoplasm, its power of blending or aggregation. This occasionally occurs in the protists. Protoplasmic bodies, with or without nuclei, born by the ordinary method of scission, adhere by their pseudopods to the bodies which have engen-

which they have diverged presents no trace nor prophetic germ of them. To this I reply that these organs or functions being good and useful, it is natural that evolution should have led up to them several times by different paths. It is thus that prehistoric men, not in communication with one another and of different races, have independently invented flint-edged instruments or erected menhirs.

dered them, or detach themselves therefrom, to form afterwards aggregated masses. Others having been left at liberty for a time, encounter one of these aggregates and join it. Thus appears at the beginning of our research this grand property of association whose fortunes and development we have now to follow. By virtue of it the metazoa succeed the protozoa; multicellular, unicellular beings. By it, all the numerous animals that inhabit our planet have been built up from the simplest to the most complicated, progressively to the vertebrates and man. Association, and adaptation by differentiation within the associated groups, are undeniably the two most potent factors of evolution.

Without inquiring into the relation which the species of association now under discussion, which is at once morphological and physiological, bears to that which we encounter under the specific name of *societies*, we will continue our investigations and cast a glance at the phenomena which the first kind offers.

The first aggregates, the so-called animal colonies of naturalists, were undifferentiated. All the cells were alike and constituted so many distinct individualities arranged in simple juxtaposition. Upon their first entrance into the kingdom of the metazoa, where henceforward they bear the name of plastids or anatomical elements, these cells were placed in conditions of life, which varied by reason of their different situations within the aggregate, and each cell was constrained to adapt itself to this situation. The first differentiation of their mass and the one which was most urgent, was effected at their centre, where a digestive cavity arose; the next was effected in the walls of this cavity which were doubled, the external layer being in contact with the circumambient medium, and the internal layer with the water which penetrated the cavity, both acquiring the special character which their functions demanded. Olynthus, a primitive sponge, is an example. The second adaptation is in the various forms which this primitive plan is led to assume according to the circumstances of its condition, becoming elongated or ramified as it is in polyps, or taking some other form. One of the extremities, that which is in contact with the ground, becomes attached to the ground; the other, the free extremity of the cavity,

or digestive tube, provides itself with tentacles and becomes the mouth. The primitive cells, conjoined in groups, have thus given rise to distinct sorts of individuals which have been denominated according to their functions, digestive, prehensile, fixative, etc. Quatrefages has counted as many as seven kinds, not including the cells of junction or indifferent cells, which in some polyps are formed in sheets.

So far we have had nothing but the application of the grand law of necessity: adaptations to the conditions of the environment or death. Every plastid or group of plastids is subject to the exigencies which its situation brings with it. Morphological differentiation, that which is most favorable to the tasks imposed, is spontaneously effected. Every group is individualised in the functions which are allotted to it. Each has lost in a corresponding degree its ability to discharge other functions, and has been supplanted in their performance by its neighbors which it in turn has supplanted in theirs. Some of the cells of the community have obscure parts to fill. The parts of others are leading, and necessarily the latter take the supremacy. The inequality between the members of the colony is striking, but it is in the interest of the common weal. Solidarity is the result,—a solidarity which cannot help augmenting at the expense of all the individuals, but especially of the less useful, and which tends to culminate in the general unity of the whole. When this point is reached, our adapted and solidarised¹ colony forms throughout all its parts a single organism only,—an individual which has taken the place of all the old, minor individuals which are now fused and lost in its midst. This is the *meride* of Prof. Edmond Perrier.

The animals comprised under the designation *merides* are all metazoans, more or less low in the scale. Their young migrate and become fixed elsewhere, or live at liberty, or adhere together, thus laying the foundation of a new species of colony of the second

¹At the suggestion of M. Topinard we use throughout this article the words *solidarise*, *solidarisation*, etc.; no existing English words have the exact meaning of the French equivalents of these neologisms, which have their justification and their analogue in *solidarity*.—Tr.

dary degree, the members of which pass, or at least may pass, through the same stages of development. The colony augments and is differentiated; its parts become consolidated, and the whole again forms a single organism, a colonial individual. This is the *zoöid* of M. Perrier.

In their turn, these zoöids lead independent lives as distinct and ambulatory individuals, or they gather together in groups and by coalescence give rise to colonies of the tertiary degree. More complex adaptations than the preceding, yet analogous thereto, arise. The parts not only adapt themselves to the external conditions, but also to one another. Fusion, atrophy, and overlapping of organs result. Solidarity and harmony are established, and the result is again a single organism—the *deme* of M. Perrier. The higher invertebrates and all the vertebrates are demes. The human organism is a deme, that is to say, a consolidated colony of zoöids or zoönites of which the initial cellular aggregates are represented by anatomical elements.

Merides, zoöids, or demes; colonies of plastids, of merides, of zoöids, or of compounds thereof; colonies of elements of what degree of individualisation or solidarisation soever, all depend on the varied conditions of existence in which they are placed. In the higher animals the factor which seems to have the most influence is food. In the lower and middle invertebrates, it is difference of habitat and hindrances placed in the way of free development of parts. The animal is fixed or natant; it crawls about in the water, in the mud, or creeps about upon the earth. Of all the circumstances most favorable to its evolution and perfection, the first, beyond dispute are unrestricted liberty and struggle of the liveliest sort. Fixed colonies, says Perrier, never become completely transformed into individuals. Colonies which at liberty have attained a certain development, retrograde if they become fixed. Such is the predicament of the ascidians, which through having immobilised themselves have fallen from the rank of vertebrates to that of worms; and it is also the case with anatif, the stalked barnacle, which is a degenerate crustacean. Among the causes which produce deviation of development is the formation of squamous valves, of a tubular

or spiral calcareous case—the compressed parts atrophying. Another cause of deviation is parasitism. Certain zooids or colonies of zooids, on coming into media where life is easy and food constantly at hand, lose nearly all their organs except their digestive tube, and are practically reduced to the apparatus of reproduction. Slave-holding ants, becoming wholly incapacitated for self-support, die when deserted by their slaves. And yet these degenerate species on being restored to favorable habits regain their power of evolution in any direction. This is universally the case with ascidians. When they have attained their liberty they give birth to exuberant colonies called pyrosomes.

There is left us from our survey this fundamental fact. If evolution is to be profitable, progressive, and productive of its best results, the individual must conserve its full liberty, must possess its full power of reaction; in other words, for obtaining the normal play of the conditions of existence, no hindrance must be interposed. As the economists say: *laissez faire, laissez passer*.

In sum, evolution beginning with primitive protoplasmic bodies, has produced the metazoa by following five directions and proceeding from five sources. As enumerated by M. Edmond Perrier these are as follows: the larva of the sponges, the planula of the polyps, the gastrula of the echinoderms, the nauplius of the arthropods, and the trochosphere of the worms, from which are descended the vertebrates, and consequently man. This gigantic work was accomplished during untold ages substantially by means of *association* with its attendant consequences—division and specialisation of labor, functional and then morphological differentiation, reciprocal adaptation of parts, and finally their solidarisation, culminating by progression in unity.

Let us return to one of the primitive properties of protoplasm, to its excitability or reflexibility. In fact, this may be subdivided into two properties, as the preceding designations indicate. An infusory or organic debris passes in front of a moner and an excitation is produced: the matter is seized; this is reflexibility or reaction. Subsequently, on the protoplasmic substances or cells becoming aggregated, these two properties are combined and pass through the

same stages as association. Like the latter they are differentiated according to position and according to needs. They partake of the fortunes of the different groups or individuals, which are here digestive, here reproductive, there nutritive, and there prehensile. They become severally strengthened in their distinctive characters, and appear in various forms. Excitability becomes buccal, visceral, tegumentary, exploratory, locomotor, or general sensibility. Reflexibility is made to harmonise with different sorts of corresponding reflex movements.

But physiological differentiations cannot persist without being followed by morphological differentiations. In the protoplasm or cell there is nothing material to indicate a differentiation of the two properties. At a certain stage, the repetition of the same impressions and of the same acts forcibly compels certain plastids to adapt themselves to the double rôle, and thus gives the impulse to their transformation. Thus are born, at this spot and at that, the first nervous fibres and nervous cells—fibres for the transmission of impressions or reactions, and cells as an intermediate focus of reflex action. This step accomplished, the rest proceeds of itself. The cells by association and multiplication become ganglia, the fibres nervous cords. The most active, the most necessary ganglia assume the hegemony. Each meride, each zoïd in a radiate or linear colony has its own ganglia. Their mutual adaptation is accomplished in the most favorable manner agreeably to the principles of necessity and economy; the superfluous ganglia disappear, others are newly formed, communication between them is strengthened. In short, the first type of a nervous system of high solidarity arises—the type which I call *ganglionic*, and of which the higher arthropods are an example.

A delicate question arises here. Where, when, and by what mechanism is the sense of personality formed which inheres in the merides, zoïds and demes—that is to say, the ego?

We have seen that the second property of protoplasm resolves itself into an excitation followed by a reaction. All inquirers do not look at matters in this simple light. A moner or an amœba presents itself to the observer under different aspects. It is immobile and

has its pseudopods more or less extended or contracted ; it roams about, impelled by influences wholly beyond our power of detection ; it circles round a chance infusory or organic debris which has strayed in its path ; and finally, when the latter has come within reach, it lengthens out its pseudopods and seizes it. In these phenomena, which are certainly rather complicated for so simple a being, some observers have seen intention, memory, and will, in a word have discovered in them an ego, obscure though it be. Others have held, and experimentally proved, that the property of performing movements, and particularly of lengthening and shortening pseudopods, can be effected by various physical and chemical agents. Shaking the water in which an amœba is immersed, touching it with a blunt needle, causes slight contraction of the pseudopods, and if the operation is repeated, marked contraction. At a temperature of 35° C. or thereabouts the movements of the amœba are exaggerated to the point of rigidity, below this they are normal, and lower still they are much weakened. Light is without action on amœbas but it causes bacteria and diatomes to run from its presence ; a fact, parenthetically, which marks the degrees of development of motility in protists. Among chemical agents some attract, others repel amœbas ; some excite, others destroy their movements ; anæsthetics have the last effect. Oxygen stimulates their movements and its suppression stops them.

From these effects, to which those due to electricity might be added, it is permissible to conclude that protoplasmic bodies obey in a general manner the same influences that living matter much further up in the scale obeys. But they do not prove that the movements normally produced by natural stimuli, as by the passage of an infusory, are necessarily directed by any sort of centrosome. When a mineral with an avidity for oxygen discriminates and picks out that oxygen in a medium containing nitrogen and carbonic acid, we do not say that it exercises choice. Amœbas have been observed to perform the same movements in engulfing substances unfit for nutrition, such as fragments of hair, for example. An amœba which makes for an object or circles round an infusory, may be simply obeying the excitation which imperceptible disturb-

ances in the water produce. If we attribute an ego to the simplest protists, by way of a preface to the ego which exists in high orders of metazoa, it would be incumbent upon us also to attribute it to sensitive and carboniferous plants, which would certainly be extravagant. And yet, if we grant the existence of individuality in unicellular beings, and that cannot be a subject of doubt, it is difficult to refuse to them a corresponding *sense* of individuality. The preferable course would be to admit that in the kingdom of protists, particularly before their differentiation into protozoans and protophytes, the properties of protoplasmic bodies, viewed singly, are of the physico-chemical order, that life is their result, but that the ego in however infinitesimal a degree we may assume is not yet existent,—in other words, that the movements in question may be classified as mechanical reactions following mechanical excitations. With this reservation, and for brevity of description, we shall not hesitate to make use of the word ego as a synonym for the virtual centre of individuality.

In the initial associations, the cellular individuals being all alike, there is no change. But when groups are formed, collective individualities, having a definite value, are constituted, each being in relation to particular functions of the group. From these spring and are to be distinguished a like number of *partial egos*, which busy themselves only with what immediately concerns them. Those buried in the depths of the aggregate interfere only in the obscure phenomena of digestion. Those which are superficially in contact with the exterior world are incessantly alert. The operations of the one set are restricted to a domain of limited interest, those of the others extend to important organs designed for the capture of prey and for its prehension, for attack and for defence. Naturally the latter attain a greater development. So long as the groups are not united by nervous elements, these egos will remain isolated and will sustain no relations with their neighbors, except through shocks mechanically transmitted from place to place. But as soon as the ganglia have centralised the individuality of each group, and as soon as the nerves have put them in mutual communication, each will take what is its due, a hierarchy will be established and the

responsibilities be divided. There will be the particular interests of each partial ego, and the interests of those charged with the dominant functions and the general welfare. Each will have its independence in its own sphere, but in certain circumstances all will be solidary. Solidarity, however, implies some sort of general and higher ego.

In the generalised ganglionic period, at which we now are, acts are always reducible to an excitation followed by a reaction, but with the three following complications: (1) the conversion of the excitation into movement is no longer effected at the spot but in the nearest ganglion; (2) the ganglion discriminates between the different kinds of excitation and responds by simple or co-ordinated movements varying with the excitation; (3) the excitations occasionally pass beyond the ganglion and spread in greater or less degree to others. Suppose an impression is produced on the antenna of an insect. If it is slight, it will act locally on the cells or tissues, and the extremity of the antenna will wrinkle. If it be increased, it will be reflected to the nearest ganglion, and the antenna and jaws will be set in motion. If it is strong, the entire animal will respond to the reaction. Does an ego intervene in this last case? If the co-ordinated movements have already been produced and repeated under the same conditions and a habit has resulted, then this assumption is useless. But if the impression is novel, if there is occasion for a modification of the act, in a word, if initiative is needed, then necessarily an ego must intervene. But where on this hypothesis is its seat? In one or in several ganglia together? I conclude in several. Morphological unity does not exist as yet in the ganglion of the insect. The insect has its sense of individuality, it discriminates what is parcel of itself from what is extraneous to it. It has its subjectivity, but this subjectivity, its ego, is diffuse. All the facts set forth by Sir John Lubbock in his work on bees and ants, and by other authors who have written on this subject, confirm this conclusion.

At some unknown period in evolution a grand advance is made in the nervous system. A series of ganglia arising from the zoönites of a linear colony are fused into a long cord, the spinal cord of

vertebrates. We know of no living animal limited exclusively to this organ, excepting the larva of the ascidian and amphioxus. But physiological experiments on ordinary vertebrates have indicated what would be its functions. In this hypothetical organism certain impressions will be converted into movements by scattered ganglia in the viscera and along the paths of the nerves; others, more intimately connected with exterior acts, would have their centres of reflex action and of co-ordination in particular zones of the cord; those which play a controlling part and induce modifications of the preceding movements would end in the sensorial ganglionic net of the cephalic extremity of the cord. We say in the net, because everything leads us to believe that the ego is as yet diffused.

The last and greatest progress is accomplished when around the sensory ganglia of the extremity of the cord a proliferation is produced of the cells and nervous fibres, which gives rise to the cerebral hemispheres. Henceforward there is no more doubt, the centralisation of the ego is effected, it has found its true expression; seemingly the ego has been transported from the cord to these new organs, but it is so only in appearance. It is a new ego, *sui generis* and intelligent, that has been formed. The ganglia of the body continue their organic rôles and maintain their petty individualities. The cord fulfils the same functions and also preserves its powerful individuality. The hemispheres are simply a superadded organ—the organ of thought.

Ganglionic animals (Insects, etc.) do not think; they reflect impressions, by associating or not associating under given conditions the action of several ganglia. Animals having hemispheres, that is to say, vertebrates, alone think. Rudimentary thought at its beginning in the lizards of M. Delbœuf, in the crocodiles of the Nile, and in fishes generally; having less value perhaps at this period than apparently it has in certain ganglionic animals; but already reaching considerable heights in the birds and the mammals, attaining its highest in man, and always proportional to the diverse morphological factors of which it is the result! Through it, the ego of the hemispheres intervenes, occasionally, and at its leisure, more or less conscious of its motives of action, suspending, accelerating,

or modifying the co-ordinated acts relating to its exterior life, of which the cord still remains the centre of production. The scattered ganglia have their habits, the results of the repetition of the same acts confirmed by time; the cord has its habits; the hemispheres have also their habits, but of a different kind. The hemispheres alone when their attention is sufficiently solicited, when the interest, pleasure, or caprice of the individual is at stake, and when they will it, are able to alter their own habits and those of the cord. They alone represent the reasoning ego.

It follows from this examination that the ego, such as we have experience of it in ourselves, is the final product of a long evolution which can be reduced to four stages. In the first, or in the solitary cells of the protist kingdom, it existed merely in a potential state. In the second, or in the non-solidarised colonies, it was presented in the form of partial and scattered egos whose sphere was restricted to the special functions with which the group that each represented was clothed. In the third, or in the solidarised colonies of the generalised ganglionic type, it had its seat in a diffuse form in the main regulative ganglia, and as yet furnished but a vague sentiment of general individuality. In the fourth, or in the vertebrates, it is housed in a special organ subsequently superadded; here it had its modest birth, developed little by little, and ended at the summit of the scale by becoming the mighty ego of man.

Virtual, diffused, or centralised, its rôle in all animals is to afford individuals the sentiment of their conservation, of their needs, and to force them to obey the injunctions of nature on penalty of annihilation. In its highest degree it comprises memories of the past, acts, sensations, and thoughts, the sum-total of its internal and external impressions; it gives to the individual the sentiment of its present corporeal existence and the notion even of its faculties and intellectual operations: *cogito ergo sum*. Animals provided with hemispheres alone think; man alone knows that he thinks. The ego is the consciousness of self—it is the soul.

Let us go back to the first law, not of life, but of the conservation of life in individuals, be it protoplasm, cell, meride, zoïd, or deme—the obligation to conform to circumstances, that is to satisfy

their needs while yielding to outward necessity and acting in the best interests of the organism. The partial egos had control of the individual functioning of each group or organ to which they belonged. The diffused ego, predominating in certain ganglia, was charged with more general interests, such as related to the exterior world. The centralised ego was established to look after the same interests but was vested with more authority. This is its whole part. It distinguishes what is external to it from what is within the sphere of its interests. The external world is indifferent to it, according as it does not or cannot affect its existence. It has no other concern but to perceive and foresee. It refers all things to itself; it is zoöcentric, that is to say, egoistic. We cannot conceive of a unicellular or multicellular animal that is not egoistic. It is the very essence of individuals. It remains to be seen whether this egoism cannot assume different forms, and whether it is not subject to differentiation according to the law controlling all properties, functions, and organs.

The acts of animals always involve conservation. In the protoplasm or cell, in the sponge or the polyp, before the nervous elements have made their appearance, it is contained in the good which results therefrom for the organism and in the evil which is avoided thereby. The good is useful to the individual as the bad is harmful. Later, when the first nervous elements have appeared and sensibility has become established, the impressions are distinguished into pleasurable and into painful; all partial egos, be they inward or superficial, are aware of this distinction, each in the matters which concern it. These impressions at a given moment become accentuated, constitute actual feelings of pleasure and pain, and remain henceforward the criterion *par excellence* impelling the animal to act in this or that direction. The diffused ego of crustaceans and of insects, scarce holding predominance in certain ganglia, has certainly no other immediate guide. The ego of the vertebrates centralised in a special organ is in the same predicament: impressions of pleasure and of pain coming from the periphery or awakened in the hemispheres by the recollection of prior impressions are the determining causes of reactions. Here a new factor intervenes.

To avoid immediate pain, to experience immediate pleasure and by means thereof to obey the direct injunctions of the external world has been hitherto the sole motive spring of action. But the ganglia, the spinal cord, and particularly the hemispheres have become complex organs endowed with new properties, the result of differentiation. They no longer restrict themselves to brutally responding to present peripheral sensations. The impression agitates the organism in its entirety, awakens prior impressions which memory has stored up in latent forms; the response need not be that which the impression of the moment demands, but that which awakened prior impressions prefer. We have here an association of impressions as in a different sphere we have an association of ideas. Actions are most frequently the result of such a process. And hence we arrive at a second formula—the shunning of circumstances wherein previously pain was produced and the seeking those in which pleasure was felt. The lizards of M. Delbœuf creep into their keeper's hand in order to find there the agreeable warmth which they have experienced before; they allow themselves to be caressed because the passage of his hand over their rough skin has previously occasioned them pleasure of which they preserve a lively recollection. The crocodile who flees when he sees the stick with which he has been struck, obeys the impression aroused by the present impression and not the present one itself. Animals generally are led thus to approach individuals of their own and other species who have never done them harm and with whom are associated recollections of pleasure. They return to such persons and acquire the habit of doing so. This custom being repeated from generation to generation, a particular sentiment is formed, increases, and the habit thus established becomes a need—the need of living with others, sociability.

A remark as to the advantages procured by this life in common. The animal is less frequently attacked by his habitual enemies; he has a chance of concealing himself in the mass of his fellows in times of danger; one or another of his companions possesses qualities by which he may profit. His interest and pleasure combining to start him on this path, this animal will, unawares to

himself, gradually come to love his comrades. On occasions he will represent to himself their joys and their sorrows, will endeavor to feel and to share them. As the sight or memory of delicious morsels makes his mouth water, so he may be led to shed tears, as seals do. At the right moment he will run to the aid of his fellows, will perhaps forget his own personality to save them, and may be capable by reflex instigation of the most praiseworthy devotion. It signifies little that the habit has grown up progressively without his suspecting it; that the first cause and the secondary causes were the pleasure felt; that the personal interest of the organism was the direct or indirect motive. The unconscious sentiment which responds to it is designated altruism. Sociability and altruism are joint terms. They imply mutual concessions, advantages mutually tendered, and consequently a lessening of egoism. This latter is the love of self, altruism is the love of others, in various but marked degrees.

The difficulty is that the two frequently come into conflict; that personal interest, the first by birth, is of the essence of personality and has anteriorly contracted deep-rooted habits which never lose their hold; that the altruistic habits which are born subsequently are more feeble and less direct; and that in all struggles the first have the advantage. The life of animals like that of man daily offers examples of this conflict. Happily for altruism the animal is extremely spontaneous. He thinks little or only obscurely before acting. He readily abandons himself to secondary automatic impulses. Habits are his second nature, they are multiple and conflicting; the animal obeys the strongest at the moment, according as circumstances favor the one or the other, or as reflexes of this or that character intervene with more or less rapidity. The animal, like man, frequently yields to temptations which can only involve him in pain; sacrifices a useful act for some immediate pleasure. He has his passions, and is subject to all the forms of nervousity, some coming from his egoism, others from his altruism. But when equilibrium has been restored, when the individual has gotten possession of himself again, when he has recovered the sentiment of his conservation, and the memory of the pains and pleas-

ures consequent upon his acts, when he is put in a position to choose,—his ego, that is to say, his true interests, once more regain the upper hand and direct his conduct.

Certain peculiarities of the animal organism of vertebrates reinforce the predispositions to sociability and altruism as just described. One of the most remarkable characteristics of life is its property of extending itself, of propagating itself like the flames of a conflagration, of multiplying, and of never being fully satisfied in this regard. This, properly speaking, is the primal cause of evolution. Every cell increases, every organ augments, every function expands proportionately to its activity. This exuberance in the young, where anabolism predominates over catabolism, to use the jargon of the day, engenders an excess of muscular activity which requires expansion and of which one form is the need of play. Insects often show traces of it; it becomes marked among the fishes and reptiles, and is quite pronounced in birds and mammals. The Felidæ and Canidæ run, gambol, wrestle, caress and maul each other from sheer joy. The life of monkeys is passed almost entirely in play. Although this need diminishes in adults and disappears among the old, it could not help contributing strongly to the formation of groups. The same exuberance of life impels animals to be noisy, if I may so generalise the idea. There is the so-called cry of insects, the croaking of frogs, the singing of birds, and the various means of communication which obtain among animals. But these manifestations of activity on the part of certain organs are contagious through imitation; they draw auditors and solicit admirers. There is no doubt but this factor has contributed largely to establishing *rapprochements*. If we wished to adduce the case of man, the proof would be easy, but it is sufficient to recall to mind the case of birds, of nocturnal carnivora, and of certain monkeys.

The same exuberance of life has resulted in the irresistible need of testing the range of one's power, and of making extensive use of it, of directing one's actions to surrounding things, especially to animated nature, and particularly to one's fellows. This is the impulse of appropriating prey which has been captured, of taking

possession of the caves used for shelter, of the territory of the chase, or of the pasture to which one is accustomed ; it is the need of exerting one's authority, of subjecting, of protecting, of reigning, and even of tyrannising.

But if there is exuberance of life and sense of force in some, on the other hand and comparatively there is the sentiment of weakness and the need of protection in others. Indolent, slothful, or really inferior, these feel themselves incapable, less fitted to cope with circumstances, to supply their needs, to defend themselves ; they require assistance, protection, participation in groups where they are less isolated. Hence arises the natural division of individuals, as of species, into the strong and the weak, the protectors and the protected, the courageous and the timid, into individuals predisposed to egoism and to combat, and individuals predisposed to altruism and to quietness. This distinction exists in their life as a whole as well as in that of sex. The male is strong and exploits his power, the female is weak and yields in her weakness. These two factors—directing and being directed—are extremely influential in the formation of social groups.

It would be supererogatory to remark how these various springs of action, which are ultimately reducible to two,—the need of affirming and of satisfying one's ego and the need of taking possession of the non-ego,—must necessarily exert a powerful influence on the development in animal societies of likes and dislikes, passions and active or sensitive faculties. Egoism and force engender emulation, the desire to do better and more, self-love, pride, jealousy, hate, the spirit of reprisal. Weakness inspires submission, sympathy, recognition, suffering, fear, love. But we must not enter on this subject, as it would carry us too far.

Let us recapitulate:—egoism is the expression of the centralised ego. It is love of self. The need of a large life, with a maximum of pleasure and a minimum of pain.

Altruism in its general sense is the love of what is outside of self, or, to be more precise, the love of that which promotes, or tends to promote, the welfare of self. Nevertheless, the word in its particular sense applies only to fellow or kindred creatures.

Altruism is a differentiation of egoism. We ought to say—the altruistic *interest*.

To be in connexion with the exterior world, to receive exterior excitations, and to multiply the sources of enjoyment which they afford, is a need of the organism which grows in intensity according as the central sensibility is more developed in the individual and in the species. It leads to the need of living with one's fellows, or to sociability.

To seek assistance and protection, to share difficulties, to desire much and give little, is the characteristic of personal interest. It also leads to association.

The ego and the association of egos are the two poles of evolution. In the merides and zooids the egos are weakened by the progress of solidarity. In the demes, associating under other conditions and under the name of animal societies, the egos maintain on the contrary almost their entire independence. But is this detrimental to the solidarity? This we shall discover by degrees.

* * *

A few words, before continuing, on reproduction. It is of two kinds—asexual and sexual. In the first, a part of the individual separates by scission or by gemmation; in the second two elements, differentiated in opposite senses, unite into one. Reproduction by scission is peculiar to individuals formed of a single cell; it is to be met with, however, among certain merides or zooids, such as *Medusa*, *Asterias*, and *Microstoma*. In the latter it furnishes the key to the formation of linear colonies. It is maintained in the vertebrates in particular cases and for the multiplication of anatomical elements, like the cells of the epidermis and the cells of the glandular secretions. Reproduction by gemmation is a second stage of asexual reproduction. It is peculiar to the lower invertebrates, where it multiplies individuals, completes colonies, and frequently alternates with sexual generation, which tends more and more to take its place. Sexual reproduction is the definitive stage. It becomes established as the types get fixed and determinate species are constituted. Elementary in some protists, it becomes more common in the lower invertebrates and is generalised in the higher

invertebrates and in the vertebrates. It consists essentially of the co-operation of two different cells, one male and one female, which are blended into one, possessing the combined latent characters of both. From the protozoans to man all gradations of sexual generation are observable.

At first, there are two cells, presenting no appreciable differences, but which meet, exchange parts of their nuclei, and then separate to continue independently their existence and to reproduce by the ordinary process of division met with in unicellular organisms. It would be opportune to ask here, what the utility is of such a union, which apparently effects no change? These two cells, it is asserted, have severally exhausted their capability of division and have nothing left but to die until the exchange which is made rejuvenates them and renders them fit to pursue a new career. In the second stage, two cells, still alike, blend totally and form but one, which reproduces the type of the common parents. Here, some will add, teleologists no doubt, that the divergent characters are neutralised in this manner and that the common characters, being better transmitted, assure the perpetuity of the type. Be it so. But that does not suit with the theory of Weismann that the differences between two copulants alone produce the variations of type which natural selection subsequently makes use of. In the subsequent stages the two cells become gradually differentiated morphologically and take on the characters of their respective sexes. The female is large and passive, the male is small, lively, and flagellate. Subsequently the profound phenomena of fecundation are exhibited and the fecundated ovum pursues its ontogenetic evolution by reproducing in epitomised form the phases through which has passed the phylogeny of its parents.

Here a difficulty arises, touching the conjunction of the two sexual elements. At the start in the metazoa the two reproducers are individuals, differentiated in opposite senses but belonging to the same colony; the distance for meeting is short, chance favored by currents produces the conjunction. For some time, in radiate and lineal colonies, the sexes continue thus united in the same individual, which is styled monœcious. But gradually they get distrib-

uted on different individuals. A succession of cases shows the transitions. Thus, one individual is hermaphroditic and plays in juxtaposition with another the rôle of both male and female simultaneously, and afterwards successively. When in these conditions one of the rôles is weakened, the corresponding genital apparatus becomes atrophied and the individual remains either male or female as the case may be.

All vertebrates to which we limit ourselves, are bisexual. In a very early phase of evolution the female restricts itself to depositing its ova in places where they are afterwards fecundated by the male. Neither the one nor the other is solicitous as to consequences. The young break their eggs as best they can, immense numbers perish for want of care, but the prodigious fecundity of the female compensates the losses. At this point evolution seems to hesitate as to the direction which it will follow. In some fishes and batrachians the male takes charge of the eggs, but this care does not extend to the young. Selection, the supreme judge of the value of the path followed, has pronounced itself against this system. Then appears the second phase in which the responsibility for the eggs and the young falls entirely upon the female. This is evidently the procedure which best assures the perpetuation of the species. Adaptation to necessity has acted wisely. But is there not corresponding to this specialisation of the final phases of reproduction in the female some useful complement, some assistance on the part of the male who has co-operated in the initial operation? In some invertebrates he dies after having fulfilled his task; in the vertebrates he lives. And here intervenes an instinct, a special sentiment, which is to the general function of reproduction what the ego in egoism is to the general function of relation to the external world.

The germ of this instinct is discovered in the fecundation of the very lowest beings. The attraction which leads the female cell to the male cell is visible: the one rests immovable, the other advances towards it, and before union gives evidence by its movements of genuine agitation. In some fishes, less indifferent than the general run, a like agitation called rut or heat is observed accompanied at times by concomitant and diverse physiological phe-

nomena, such as a change of color of their external scaly integument. It leads in some reptiles, and then in all birds and mammals, to the phenomena of copulation.¹ But at this stage is awakened in the female a sentiment of a quite special character and without precedent in the phylogenetic line. There is an obscure presentiment of it in certain reptiles, and it reaches its highest expression in the birds and the mammals. It is the sentiment of the proprietorship of eggs and of the young—*maternal love*, one of the most admirable creations of evolution. A similar sentiment is developed in the male, but obscurely and laboriously, being subject to numerous exceptions here, and varying from zero to perfection. After rut the male becomes attached to the female, protects her, and transfers his cares and affections to the little ones which are born from her. From the sexual union of the two results a family union which generally lasts until the young are able to take care of themselves.

Such, rapidly sketched, are the phases which beginning with the differentiation of the sexes in the first cells have led to their separation in individuals and, in this, from complete indifference to offspring to association in families having in view the training of children. It remains for us to pass on to the facts.

II. THE ANIMAL FAMILY.

Whatever may be our attendant regrets, for the subject is interesting particularly among hymenopterous insects, we shall pass by the invertebrates and confine ourselves to the vertebrates, a province sufficiently vast in itself. Three forms of association are presented to us, the first intermittent, between two individuals of different sexes, with a view to reproduction; the second, eventual, between two or several individuals, with a view to mutual assistance and companionship; the third, temporary or permanent, under the form of assemblages or societies.

We shall commence with the first and devote some space to it.

¹ Some fishes, it has been observed, already present phenomena of interior fecundation.

The facts involved are of a special nature ; they are either mingled with or alternate with those which refer to societies, and they render the latter facts obscure ; the family in which they culminate is regarded rightly or wrongly as the foundation—the formative cell, as it has been called—of societies. There are disadvantages attending the separation of the two subjects and there is danger of repetition ; but the drawbacks are outweighed by the advantages.

The Fishes come first. They are divided into two groups. The first is that in which the young are born alive and where there is interior fecundation, and the second is that in which the female lays its eggs in some place, selected or not selected, where they are fecundated by the male. The majority of cartilaginous fishes and some bony fishes belong to the first class. The others, which constitute the great majority, belong to the second. Among the first a certain degree of maternal love apparently exists. A female plagiostome has been observed swimming in company with her young, which she would not abandon until they were able to look out for themselves. In the second, considerable variation is noticeable. At first there is complete indifference ; the female lays, but evinces no further concern for, her eggs ; the male passes over and fecundates them but likewise exhibits no solicitude for their fate. But at times a certain attraction is manifested between the two sexes without copulation. The female when laying her eggs is followed by one or several males. An agitation analogous to that of rut has been observed in the male, its object being either the female or the eggs laid. This rut proceeds so far as to occasion combats between rivals. The male conjointly with the female, or alone, prepares a sort of nest. One or the other, or both, watch over the eggs. I have seen in the aquarium at Naples a fish living with a female companion and even exhibiting extreme jealousy. The most curious case is that of *Gasterosteus*. It very carefully and by its own exertions constructs a cylindrical nest ; to this it conducts a female and expresses its joy while the latter is laying her eggs, whereupon it goes in search of another ; it then walls up the entrance to the nest, watches over the eggs until they have been hatched, and defends them against females which visit the place with the intention of de-

vouring them ; finally, it takes care of the little ones and does not give them their liberty until they have no longer need of its protection. Other and more astonishing cases still are the following : that of several male Lophobranchii, who harvest the eggs and taking their station directly upon them protect them until they are hatched ; that of Hippocampus and Syngnathus in which the eggs are kept in a ventral or caudal pouch ; that of two or three species in which the male hatches the eggs in its mouth.

Sent living into the world, or hatched by themselves, the young of fishes, consequently, are abandoned and perish in large numbers on account of lack of care. But the prodigious fecundity of the majority compensates this loss. The salmon lays nearly twenty-five thousand eggs, the sturgeon millions. Finally, diverse tendencies are manifested as regards the care of the young, some species leaving to the mother the reproductive rôle until the very end, and others confiding it to the father. Is it maternal love or paternal love which is destined to gain the ascendancy? There is also a quite curious marsupial tendency. Evolution seems undecided as to the most advantageous path to follow.

The anurous Batrachia come next, and after them the urodelous. The first deposit their eggs in the water or in the sand, where they are fecundated in an unknown manner. Incomplete coition is effected in some species, the eggs being fecundated as they are produced. A few special cases must be noted. In the South-American Surinam toad, the male places the eggs on the back of the female, where they sink in and are hatched in tiny cellules. In other anurans, the male winds chaplets of eggs around his legs, and devotes to them the proper care till birth, when the young are abandoned. In *Nototrema marsupialis*, incubation is effected in a special pouch carried on the back of the female. Evolution is again making attempts in different directions. Is it the father or the mother that is to have charge of the eggs? On quitting the oviduct, whither are the eggs to pass? Into a pouch furnished by the male, or into a pouch furnished by the female? Of brooding or sitting here, there is no question.

The Urodela enter a new phase. Here, says Espinas, "the

males fecundate the eggs in the body of the female." Of these eggs, which are laid subsequently, some care is taken by the female ; but the male is ignorant of their whereabouts. This, in conjunction with certain facts presented by the anurans and fishes, has led Espinas to a theory which we shall state as follows : When the female lays her eggs, she is relieved, and abandons them without further concern. When the male afterwards approaches, and expends upon them the ardor of rut, he regards them as his own property and takes upon himself the responsibility of their charge.

In the Reptiles, all hesitation is at an end. Fecundation always takes place in the interior, previously to laying, and by copulation. The female lays fecundated eggs ; conceals them more or less carefully ; but as a rule shows little further concern for them. She believes her task is finished and is not prompted to continue it further. Nevertheless, some females watch their eggs a little, or even sit on them. Some, after hatching, carry their young to a place of safety, or lead them to the water, but afterwards they forsake them. In the trigonocephalous serpents of Martinique, and in the cayman alligator, the female takes care of them for a longer time. In the latter she has been seen to defend them with great fury and has exhibited symptoms of genuine maternal love. As to the male, his rôle is almost entirely limited to copulation. Some reptiles fight at the period of rut ; some go in pairs. In certain crocodiles, the male and the female sit in turns. Some males even go as far as to assist the female in hatching. The most instructive case is that of the Iguana. This lizard lives during a portion of the year with the same female and will vigorously defend her against others of his species, as he would his own property. But neither takes charge of the eggs or of the young. They have the sexual passion only. With the rattlesnake it is the same. Male and female wander lovingly about together, embrace at times, but leave their eggs to hatch alone.

To sum up, in the four groups which we have examined, isolated cases exhibit different tendencies, some of which open the way to what is to become habitual in the succeeding groups. Omitting details, the following is the outcome. In the Fishes and the

anurous Batrachia, there is no maternal sentiment, but as an offset there are rudiments of a paternal sentiment, arising from the circumstance that the passion accompanying rut, not being awakened by the female, is expended entirely upon the eggs and tends to be continued in favor of the young. In the urodelan Batrachia and in the Reptiles, copulation changes the situation. The ardor of rut is mutual and engenders a pronounced bilateral sexual sentiment. This moment past, the male takes no heed of the consequences; the female, left to itself, lays the fertilised eggs and takes charge of them, but does not go much farther. The maternal sentiment begins to dawn, but the paternal sentiment is zero.

Here are presented the two branches which have sprung from the reptiles—namely, the Birds and the Mammals; and in these are accentuated and generalised the exceptional cases which have preceded, and which are most favorable for the direction which is now to follow. But before proceeding we must make a digression, in order to assign the precise meaning of the terms which we are to employ.

The phenomena of reproduction in Birds and Mammals are divisible into three acts. In the first, we have rut, copulation, and fecundation, which are consecrated by a more or less intense sexual love. The second is represented by the incubation of the eggs in the case of Birds, and by gestation in Mammals. The female is here either left to herself or lives with the male. In the last case we have the conjugal period, to which corresponds conjugal love. The third stage begins with the birth of the young and continues till the latter are able to take care of themselves. This is the family period. The family is *maternal* when the mother, left entirely to herself, alone has charge of the young; it is *paternal-maternal* when the father associates with the mother; it is *paternal*, if we may call it so, when the male, having several females, is the centre of the family. Espinas has not considered this last distinction. The care taken by the mother being a constant fact without which in the Birds and Mammals it is almost impossible to conceive the young being raised,—we shall reserve the name of family proper for the last two forms.

Family, then, for us, is constituted by the association of three elements: a male, one or several females, and one or several offspring. Its consecration is family love, which is distinguished into maternal love, paternal love, and filial love, to which must be added conjugal love—a legacy of the preceding period.

One word more. In the pages to follow we shall speak only of wild species, roaming at large. Domestication and even simple sequestration in zoölogical gardens frequently produce modifications in the phenomena of reproduction, as they also do, in even greater degree, in the social instincts.

Birds. The specialisation of the sexes has been distinctly effected here. The principal rôle falls to the male in the first period, while in the female is vested the direct responsibility in the third and the second. Let us consider them separately.

The female, in the first period, plays the passive rôle. She is coquettish, but reserved, allows herself to be seduced, abandons herself with grace, is obedient to the male, even when he is fickle, and generally remains faithful to him. Among the exceptions to the last rule are, it is said, certain doves whom the sexual sense absolutely infatuates. In the second period, the laying and even more so the brooding of eggs occupies her whole attention. She is still attached to her spouse, but on the condition that he respects her eggs. If he does not do so, she abandons him and conceals the eggs. In the third period, all is concentrated on one sentiment: care of the loved young ones. The attachment which is still reserved for the spouse is proportioned to the part which he takes in this care. If her spouse leaves her, her devotion, foresight, and ardor in defending her young increases commensurately. The hen is the model type of maternal love. The instinct of brooding is carried so far here that certain females of the eider-duck will plunder one another's nests to obtain more eggs. Her tenacity in sitting, and in covering her unfeathered young in her nest, is sometimes such that she cannot be driven away, as is the case, for example, with the kingfisher. If her eggs be broken or her young die, she will repair again to the male who has abandoned her, or to another, to be fecundated afresh. We may furtively introduce

strange eggs into her nest, and she will care for the young with the same solicitude. She will adopt the orphans of another mother. In a word, the maternal instinct is consolidated in her in its last degree of efficiency, and is one of the marvels of adaptation to ends. Enfeebled forms of these qualities are met with in only a few cases, as for example in the ostrich, the cuckoo, the molothrus, the ring-dove, the tetragalle of Australia, and, according to Van Beneden, in the phalarope.

The male, in the first period, on the contrary, plays an active rôle. He chooses his female, fascinates her by his song and by demonstrations of all sorts, gives combat to his rivals, at times in real Homeric style, then copulates upon the spot, or, more frequently, leads her victoriously off. In the subsequent periods, his rôle being optional, his conduct varies. At times he remains with the female and sympathetically shares her labors; at others he basely abandons her in a spirit of contemptible egotism.

Let us follow the first case. During the conjugal period he assists the female in the construction of the nest or does it alone, fetches food, entertains her by his songs, takes turns with her in sitting or even sits alone (Rhea, Phalarope), and shares both her joys and her sorrows. Audubon recounts that *Muscicapa fulva* exhibits great agitation while its female is laying, that it encourages her, and when the operation is finished soars off in her company with great joy. During the family period, the picture is a charming one. Male and female are intimately united in the same sentiment; they vie with each other in their efforts to cause the young to swallow the food which each has furnished; they teach them to fly and to hunt.

In the second case, of the female's abandonment, three degrees are presented. In the first the abandonment is complete and immediate, directly after the male has satisfied his sexual desire or has become exhausted. Examples are the turkey, the pheasant, the prairie-chicken, and in fact the majority of the Gallinaceæ and some stilt-birds and palmipeds. Let us take the turkey. The two sexes habitually live apart. In the spring the female approaches and calls. The male hastens by, abandons himself to all the affecta-

tions accompanying rut, and copulation begins. As soon as the female begins to lay, her sexual desire is extinguished ; she gradually withdraws ; the male seeks her, exhibits dissatisfaction, is jealous of the eggs, which he seeks to devour and which the female defends. He finally seeks solace in renunciation, retires for a while to recoup his strength, and at last returns to his friends without exhibiting further concern for the female or her young, or rather for his females, as he is polygamous in rut. In the second degree the male prolongs slightly his stay, withdraws from time to time, returns at night, waits until the female has finished laying, and then quits her definitively. Such is the case of the eider-duck and the quail. In the third degree he abandons the female sooner or later, but returns to her when the young are born and have progressed slightly, and then takes upon himself the direction of the family. Examples are the hazel-grouse, the wood-cock, wild duck, and great bustard. I should add that among those of the first degree there are some who return to their female when the young are emancipated and voluntarily remain in her company until the succeeding rut, when the various stages are repeated.

In fact, correct unions—conjugal in the second period and familiar in the third—are the rule among birds. There are divers types. The type *Raptores* forms intimate unions, but is profoundly egotistical from wildness. Its couples are monogamous, live apart with their young, and savagely repel all attacks on their nests. Again there is the type of several stilt-birds and of palmipeds like the swan ; in the latter the family-circle is rigorously closed ; all are closely attached to one another ; this again is egoism, but it is from excessive mutual love. Further, there is the type of monogamous pigeons, of which the second and third periods are merely a continuation of the sexual period which is always intense. The care here taken of the young seems accessory, a sort of playfulness, and a constant occasion of sexual love ; at times in certain of these species the young are greatly neglected. Then there is the type *Rhea*, the American ostrich, polygamous from rut until the rearing of the young is completed. The last and most widely spread type is met with in the *Passeres*, *Corvidæ*, *Hirundinidæ*, the majority of stilt-

birds and palmipeds, and in some sea-birds. Its most complete expression is found among the parrots. Sexual love, conjugal love, and family love are here blended into a whole and leave hardly anything to be desired.

A few particular cases do not fall under the two preceding categories—namely, the purely maternal family and the paternal-maternal family. One case is that of the tetragalle of Australia in which the eggs are left to themselves and hatch alone. Another is that of Rhea in which the male broods by itself all the eggs laid by its females. That of the ordinary ostrich approaches to this type and deserves a few words in detail. It is polygamous; the females lay their eggs in the sand and conceal them on retiring. During the day when the rays of the sun are strong, they sit on their eggs alternately with the male but irregularly; during the night the latter alone sits. When the young are hatched, all join in taking care of them, but the father, we are assured, exhibits the greatest solicitude. The strangest case is that of a certain number of birds who occasionally or constantly lay eggs in the nests of other species and thus shirk the cares of maternity. Examples are the honey-guide or indicator-bird, the cow-troopial or molothrus, and the cuckoo. We have seen many unnatural males among birds, but unnatural females of the stripe of tetragalle and molothrus are rare. The female of the latter indulges in the most shamefaced polyandry, contracts conjugal unions of no sort, and when moved to lay seeks out in the thicket the nest of some other bird where it deposits its eggs and never again thinks of them. The cuckoo is better off; he has a female and lives with her. The latter lays her eggs in the nests of different other birds but returns from time to time to see whether their foster mother has taken care of them. When the young are able to fly she comes to them with her spouse, calls them, and thereafter both take charge of their education.

The Birds are monogamous or polygamous in the period of rut, but the males who live with their females during the second and third periods are all monogamous. The exceptions are so rare that they hardly count for anything. There are from one to three broods a year; the same couple, as a rule, remain together during the whole

term. Almost always this couple separates when the bringing up of the last brood has been completed. But sometimes they continue their conjugal union until the succeeding rut ; frequently this union lasts for years if not indefinitely. Examples of this type are the eagle, *Picus principalis*, and the stork.

The purely maternal or the paternal-maternal family in some exceptional cases breaks up before the young are able to venture from their nests, as is the case with the albatross. Usually it is prolonged until the young are able to take care of themselves, or even until their education is finished, if the return of the sexual desire permits of it. In the species having two or three broods a season, its return in most cases virtually puts a premature end to the family, the double maternal and paternal instinct disappears, the married couple again becoming lovers expel willy-nilly the young from the nest. Two broods, however, may succeed each other in exceptional cases and live on good terms. In the water-hen the young of the second brood fraternise with those of the first and assist their mother.

The young have no desire at first but to get out of the nest and then to prolong their excursions. They make the attempt, fly away, return at night, and end by never coming back at all. They then generally wander about with their brothers, the time varying with the habits of the species, but in all cases they emancipate themselves on the appearance of the sexual desire. From that time on all is ended. Parents and children recognise one another no longer. There is no reminiscence of family sentiment discoverable in them.

To recapitulate, evolution tends towards the most favorable conditions for attaining the ends of reproduction, outlined in the fishes and reptiles and reaching in the majority of birds approximate perfection. It is no longer the isolated male or the isolated female who has charge of the development of the young, either within or without the egg. A contract of union is established between the two agents of reproduction, an association has been effected, a more or less powerful sentiment unites the male to the

female and to their young. The two concur in the work, each according to its organisation.

In both, the initial period is what one would imagine it ought to be physiologically. The ardor of rut is sufficient and moderate in the female, who is passive. It is violent and capable of overturning all obstacles in the male, who is active. In the later periods the mother has the entire direct responsibility, she is equal to her task, and fulfils it with a tenacity and continuity which is marvellous. The instinct corresponding to the two periods is in her as firmly established and consolidated as is necessary. In the same periods a goodly number of males have taken no step forward, have acquired nothing which is useful to the species; but in the grand majority an instinct at once conjugal and familiar is established which leaves little to be desired. On one hand and on the other it is the triumphing of adaptation of means to ends.

There are still, however, a few discouraging features. One is the rapidity with which the sexual needs put an end to the family life, the drawbacks of which affect the second part of the rearing of the young, namely, their education. The cause at fault here is plainly the plurality of broods. For progress to ensue, it is necessary that these should be reduced to one per year. The second point is the mutual forgetfulness of parents and offspring for one another after separation, and particularly when the latter have attained puberty. But the end has been accomplished, some will say; the species has been renewed, the parents have fulfilled their task.

Mammals. The exterior phases of reproduction differ here slightly from those observed in birds. The second period is frequently long, brooding being replaced by gestation. The third period may be divided into three: nursing which concerns the mother only, the interval between this period and that in which the young have become entirely emancipated, which is short, and the time which subsequently elapses before puberty, during which the young are either free or still follow from habit the footsteps of the mother.

Mammals from the point of view of family or of society, as we

shall see later on, may apparently be divided into three groups: first, the lower mammals comprising the Monotremata, the Edentata or Insectivora, and the Marsupialia; secondly, the higher mammals comprising the Ungulata, the Carnivora, and the Monkeys, men forming a class apart; and lastly, the intermediary mammals.

The Monotremata, the Edentata, and the Insectivora are the lowest with regard to family. The armadillo meets a female, copulates and goes his way. The Sorex is little better; the male and female, when not in the period of rut, devour each other whenever they can. Nevertheless, some couples keep together until the period of the young, namely, in the Onithorynchus, the great ant-eater, the hedge-hog, and the mole.

In the marsupials the instinct of maternal love is naturally quite pronounced. Gestation lasts with them about a month, but for a space of six to eight months the young occupy an abdominal pouch where they are entirely in the hands of the mother. In the wombat, however, she ceases to interest herself in them after they have quitted the pouch, but in others she continues to bestow upon them the most assiduous care. The opossum is a model of maternal love. *Phalangista* and *Phascolarctos* carry their young on their back, clinging to their long tails. As to the male, he is indifferent after rut. In the kangaroo the male has been observed to approach and to contemplate with curiosity the young who show their heads from the pouch. In the flying squirrel he assists in forming little families.

The Chiroptera, allies of the Insectivora, are no better with regard to family. Bats copulate and do not seek each other again until the succeeding rut. The mother has sole charge of the little ones, exhibits affection for them, and carries them around clinging to her body. The reappearance of the sexual desire alone puts an end to her maternal love. The Rodentia offer various types, but as a rule these are little favorable to family life and even to the development of maternal functions. The first type is that of the hamster (*Cricetus*). The male repairs to the abode of the female, copulates, lives with her for some time on good terms, and finally

leaves her. The female, five weeks after, bears five or six young, which she fosters for some fifteen days and finally drives away when they are able to take care of themselves. The dormouse (*Myosus*), *Eliomys*, the porcupine, rats and mice, the vole (*Arvicola*) and the lemming (*Myodes*) belong to the same class. With the meadow-mouse or vole, the solicitude of the mother turns to indifference as the young grow able to take care of themselves. A second type is that of the hare; he never abandons his female for the reason that he is always in rut, as is also she, even during gestation. But more scandalous is its behaviour towards its children. There is not a trace of maternal love in the female; she carries her young thirty days, casts her litter of two to five upon the bare ground, cares for them at most but a few days and abandons them, only returning to them when her milk burdens her. A third type is that of the beaver. It presents phenomena similar to those which we have met with in some birds. The male abandons the female after rut, and does not return to her till several months after, when their two to four young have grown large enough to move about (Audubon and Bachman). A fourth type is that of certain squirrels, the male and female of which keep house until their young are able to look out for themselves; these are monogamous. The fifth is that of the rabbit. Each monogamous couple has its burrow into which it suffers no stranger to pass; they never leave each other; the male loves his young as much as he does his female, he carries them, polishes their skin, and teaches them to seek their food. The mother digs a burrow expressly for them.

One of the peculiarities of certain Rodentia is their prodigious fecundity. The number of their young is generally from three to five, sometimes one, and amounting often to as many as ten. The real cause of their fecundity is the frequency of their litters, which is noticeable, for instance, in mice and rats, and which occurs almost every month in certain voles, and seven times or more a year with the rabbit. They are all voluntarily polygamous and polyandrous, copulate a few days after parturition as is the case of the vole, if not immediately, as is the case of the mouse. Furthermore, the young are very soon capable of reproduction: the time being from one

and one-half to two months in the vole or field-mouse. It has been calculated that one couple of the latter can give birth to five hundred individuals in a single year, and a couple of rabbits to the incredible number of one million in four years. The gigantic emigrations of the lemming from Norway and the pest which the invasion of our domestic rabbit visited upon Australia and California are proofs of this.

In marine mammals, the male rarely abandons the female after rut. Still, we meet with troops of old "solitary" males as they are called who have abandoned their progeny before the proper time, as we do also with special troops of adolescent young. Some are monogamous like the walrus and probably the dugong or halibore; the others are polygamous. In the latter, the father, the mothers, and the offspring remain together until the offspring are brought up, and in some, as it seems to me, even after the succeeding rut. The maternal and paternal sentiments in these polygamous families are not highly developed, the male occupying the position of a sultan of a harem who distributes his favors among many. These polygamous, or paternal families, having some social characters, we will consider more in detail in the chapter on "Animal Societies."

While on the subject of aquatic mammals I may mention the sea-otter (*Enhydris*) which is a transitional carnivore. The family intimately united and monogamous. It is composed of the father, the mother, the suckling infants, and the infants of the year preceding. The male caresses the female with his forepaws and plays with the infants. If their infants are taken away from them they weep and groan as do the seals. The mother carries her young in her mouth like the carnivora.

The Ungulata are not very fecund; as a rule they have but one offspring each year. The *Bos frontalis* has but one every two years, and the Aurochs one every three years. The musimon or wild sheep, the Capreolus or roe-buck, have two or three young, the pig three to nine. Some are plainly monogamous, like the reindeer, the gazelle, and according to Audubon and Bachman the buffalo; others are polygamous, particularly during rut, like the Alpine ibex

and the musimon ; others are polygamous to the very end, like the Solidungula and the elephant. The female has the direct charge of the young. When the male abandons her after rut, she frequently forms with other pregnant females a special group. When the moment for casting has arrived she modestly retires aside. Her little one follows her everywhere, she suckles it, leads it to pasture, shows the liveliest affection for it, and defends it with courage. When her spouse shares with her the care of her young she is extremely grateful for it, loves him, and proves her affection for him in a touching manner. In the Capreolus where the union is of a charming character from rut until the termination of the bringing up, the only interruption happens when the female retires for parturition. A few days after, she is seen to return happy and exultant, followed by her little one ; she calls her spouse, who hurries near, abandons himself to joy, caresses his child and its mother and resumes the direction of the family.

But this spectacle is rare. Among the Ruminants the male is most frequently impelled by the sexual instinct alone or by this and the not less striking necessity of commanding, of being master. Conjugal love after rut and family love are luxuries with them. In the Solidungula, and I shall cite particularly the wild ass (*Asinus hemionus*), as soon as the male is capable of reproduction he has but one ambition, that of imitating his father, of gathering round him as many females as possible, and of making himself the head of a troop from which he jealously drives away all young males who are approaching puberty. In the Cervidæ, at times the male lives with the female only during rut, at times he prolongs his amours until the approach of parturition, and again he often remains with her until he has performed all his duties. Thus it is with the reindeer and with Capreolus. In the Capridæ and Ovidæ, the ardor of rut controls the situation and the polygamy is entirely sexual. In the antelopes, the gazelle is monogamous and assisted throughout by the male ; the capricorn is polygamous ; the chamois tarries with the female only during the time of rut, afterwards resuming his solitary life. In the Bovidæ the male prolongs slightly his stay with the female but afterwards departs to associate entirely with his com-

panions, whilst the female and her young join the other females in the general herd.

Among the Pachyderms two examples will suffice. The wild boar or *Sus scrofa* lives with its females during the autumn rut, which lasts for some weeks or for two or three months, resuming afterwards its solitary habits. The female carries its young four and a half months about, and has a litter of from three to nine; she suckles them four and a half months and protects them for some time thereafter. Several litters will follow her at the same time and thus form a little society entirely maternal in character. The elephant is polygamous. He has on an average eight females, but there are reasons for believing that he is attached to one by a sort of preference for a certain period of time. The female is in gestation twenty-two and a half months, has but one offspring, and takes extraordinary care of it. The father is also attached to his offspring, but apparently after the manner of a chief of a polygamous band rather than as a father, which is the rule among the Ungulata.

The Carnivora are less fecund than the Rodentia, but more so than the Ungulata. They are monogamous in the sense that during the period of rut they associate with but one female, and that in the minority of cases where the union persists until the family phase, they have *a fortiori* but one. The mother is often excellent and devoted to her young, but sometimes leaves much to be desired. The wildcat, the puma, and the hyena, for example, quickly abandon their young in the presence of danger or upon the approach of man. The female ordinarily chooses among the males competing for her favor. The male generally abandons the female after rut or continues to live with her for a short time. In the latter case he hunts with her, or they hunt separately, each for itself, like selfish egoists. Some, like the tiger, occasionally run to the assistance of the female when she is defending her young. Among the few cases where family love exists must be classed the lion, the cat, the dingo, the fox, the wolf, and the ichneumon of the Nile. The wolf, however, voluntarily devours his offspring or abandons them in the event of the mother's death. The lion, who is extremely attached to the lioness during the sexual period and the

simple conjugal period, is indifferent to his offspring when they are born. After a little, however, his heart is touched by their mewings, their gambols and caresses, and he becomes a model father. The harmony between the three constituent elements of the family is perfect.

The Monkeys, from whom we here exclude the anthropoids, are the highest of all the mammals in point of family. They are salacious and fickle in the period of rut, but in the end they make good husbands and good fathers. They never abandon their females after rut or before the birth of the young. They are polygamous like the Ungulata and the marine mammals, but despite their polygamy there is no trace, or at least there is but little trace of a need to pose as the head of a troop of females and offspring. Affection plays the highest rôle here. One only of the monkeys is monogamous, the *Nyctipithecus* and perhaps the Maki. The monkeys have but one offspring, or, by way of exception, twins.

Their maternal love is admirable. Personal witnesses have described traits which are profoundly touching,—of a mother in her last breath thinking of nothing but bringing her infant to a place of safety, imploring the mercy of the hunter with an expression perfectly human, or dying from grief at her loss. The female suckles her infant, carries it in her arms, upon her back, or wound round her body. It prepares its food, caresses and plays with it, gently corrects it, and shows much foresight for its welfare. Paternal love is not less developed. The two parents vie with each other in their attention to their little one, teach it to walk, climb, and to find its food. The father will run to the aid of his offspring in critical moments, and will extricate it from perilous positions. A male *arctopithecus* has been observed to take his infant from the arm of its mother and to carry it himself for a while. It is not known at what period the young are emancipated, but it is certain that parental affection and care are not limited to the first year, or, in other words, that the family is composed of infants of various ages.

In the Anthropoids the conjugal and family sentiments are the same. All interest centres in ascertaining whether they also are

polygamous or monogamous, and what is the duration of their union.

I can give no opinion regarding the Gibbon (*Hylobates*). Du-vancel's account of having seen mothers go to the river bank to wash the faces of their infants in spite of the latters' resistance, proves that maternity here comprehends its rôle. The orang-outang (*Simia*) affords a peculiarity which is frequent in mammals and which we shall speak of later,—namely, a family disposition different in the adult and in aged males. The old males are reported to abandon their females after rut. The adults, on the contrary, live with her and prolong their union for an unknown time. The family of the orang-outang is composed as follows: of a male, a female, and several young of widely varying ages amounting sometimes, as it has seemed to me, to as many as four litters. The Anthropoids, as we know, have but one offspring. As to the care devoted to this offspring the details are lacking. But when we see in our menageries the passion which the orang-outang has for infants of all kinds, and even for dolls, the delicacy with which they lift them into their arms and caress them, there can be little doubt that they are the same in the savage state. When the time for accouchement comes, the female withdraws. On the gorilla I possess unpublished data, in addition to those already known. The cases reported by negroes of gorillas having been seen with several females do not convince me. For me he is monogamous; he retains the same female in all likelihood indefinitely. He has been seen with one, two, and as many as three offspring at least, of different ages, whom he watches and defends. The chimpanzee is also most likely monogamous. In the case of Savage the family comprised a male, a female, and two infants of different ages. The following passage from Livingstone leaves no doubt concerning one of the species, the Soko: "He lives in society: some ten males together, each having its female. . . . If one seeks to possess himself of the female of another, he is knocked down and beaten by all the other males. . . . When a difficult spot has to be crossed, the father takes the infant in his arms, carries it over, and hands it to its mother."

To sum up, the Mammals, taken as a whole, are disappointing. They offer but rarely that almost ideal spectacle which so often captivates us in birds. Among the lower mammals maternal love has made a great step in advance of the reptiles, the maternal family having been constituted. But the male has remained at the same point; he abandons the female after rut. In the Rodentia progress is restricted to a few who experience the joys of paternal-maternal family life.

Among the Carnivora and Ungulata, to which we must add the marine mammals, matters tend in two opposite directions. In the Carnivora the paternal-maternal family exists; the father takes his share in the care of the young; the sentiment which binds him to his consort has not the purity which is offered us in birds, but is sufficient and accomplishes its end. The lion is the most advanced example of this type, father, mother, and offspring having for one another the tenderest affection.

In the Ungulata and marine mammals the family is paternal-maternal, but with an entirely different character; what was the rare exception has become the rule. Some are polygamous during rut only, as are many birds; but the majority are polygamous during the two other periods. In the last case, however, the spring of action is falsified. It is not a transformation of sexual love into conjugal love and alternately into paternal love which moves the father, but vanity, the desire of being surrounded by underlings, of possessing a troop over which he can exercise unrestricted authority. The number of females, which is at times excessive, and of the young which result from his many unions, proportionately weaken his altruistic tendencies. Some lose here the notion of personal responsibility and suffer it to be merged in a collective responsibility of the herd. In short, among the Ungulata, the female is what we have seen her to be among the birds, submissive in the first period, an excellent mother, devoted, and courageous in the third, her ardor to fulfil her tasks growing with the more or less complete abandonment of her male. The male on his part experiences the same agitation in rut, offers the same combats to his rivals, but subsequently deports himself differently. At times he deserts his

females with indifference, at times he keeps them by him to lord it over them, at times he restricts his activity to protecting them from afar as an integral member of the herd, and again and by way of exception he still associates with his family, as is the case with the monogamous reindeer and the almost monogamous *Capreolus*.

The Monkeys seem to be descended from the Ungulata with regard to family, but they have a less marked sentiment of domination, and on the other hand exhibit a decidedly pronounced conjugal and family sentiment. They never abandon their females; they are all good husbands and fathers. The anthropoids differ from these only in the respect that they are monogamous.

It is on the female, in fine, that adaptation has concentrated all its efforts. The maternal family is a necessity, the paternal-maternal family a luxury. Outside of the hours which he devotes to reproduction, the male has always time for living and enjoying his individual life. As to the female, she has among the birds no leisure except in winter, and none at all among the majority of the higher mammals where rut, gestation, and bringing up succeed one another rapidly and without interruption. From the moment she is capable of reproduction the object of her life is one thing—love. She seeks to please her nearest spouse, she loves him and admires him. She loves the eggs on which she broods and the offspring which are born of them; she loves him who has made her a mother and who shares with her her affection for her offspring. What a difference between her and the male, particularly among the mammals! From the beginning it is pleasure which he seeks, frequently without any ulterior motive; later it is satisfaction of his activity, the need of possessing and of dominating. The male is the egoistic element in the association, the female is the altruistic element. If to employ a word which has been much abused, the male is superior to the female in all that touches the functions of outward life, the female is superior to him in all that concerns reproduction. United they form a complete whole—the physiological unit. All this is realised in the monogamous form of the family.

The polygamous form is a contrary deviation of the physiological law. If we regard the male simply as a fecundator, whilst the

female is conceived merely as a layer or bearer, it is admissible that the male should wander from female to female and fecundate as many as possible. But physiology is not of this mind. It shows that it is less important to procreate enormous quantities of young, who will necessarily be exposed to wholesale destruction from lack of care, than to assure the existence and prosperity of a small number. It shows that in the struggle against the causes of mortality the advantage is with those who with the assistance of two parents only, have exhibited the greatest powers of resistance. According as we rise in the scale of vertebrates the fecundity diminishes; the number of eggs or of young which was so large among the fishes is diminished among the reptiles, the birds, and the mammals. But the common care devoted to the progeny is also proportionately augmented. There is no doubt, even leaving man aside, that the male is devoted to his female and to his young in the inverse ratio of their number. To reduce the male to a simple fecundator, a sultan of a harem, a chief of a herd, is to misrepresent the requirements of bringing up and of education. Polygamy runs counter to the end to be obtained. Equality of number between the sexes in the various species is proof that the unions should be made by pairs and not by pluralities.

A physiological difference will explain perhaps this resistance of the mammalian male to the development of the conjugal and family sentiments as compared with birds. In the latter the total time required for hatching is short; the interval which elapses between the termination of rut and the birth of the young is not long enough for the male to contract new habits with his comrades; the love which he cherished for the female continues during brooding and is readily transferred from her to the infants. In the higher mammals, on the other hand, the time between rut and the end of the bringing up is long; the period of gestation, which varies from several months to twenty-two in the elephant, gives rise to a long gap between the love of rut and the birth of the offspring. During this time the male grows unaccustomed to the female and seeks out his old friends. It is true that there is but one litter a year, and that the return of rut, having no relation to the natural termination

of the bringing up of the young, does not put an unseasonable end to the family as is the case with birds.

We have mentioned a dark point in the case of birds—the extremely rapid separation of the offspring and the parents and their subsequent mutual forgetfulness for one another. Is it the same with the mammals? We have cited among birds the case of the water-hen, where two broods of one season fraternise with one another, with the result that the mother is at the head of a considerable flock. The mammals frequently present analogous cases. In the Virginia opossum, says Audubon, there are three litters and more a year. The young of one may still be seen in the abdominal pouch, whilst those of the two others are found running about under the watchful eye of the mother. In the squirrel, the three to seven young of the two annual litters form a troop of from twelve to fifteen following their mother. In *Enhydris* the family goes about, formed of a father, a mother, and of the suckling young and the semi-adults. In the wild boar the mother moves about with the young of different years. In the orang-outang and the gorilla the mother and father have been met accompanied by young of widely different ages. There is no doubt that in mammals the family shows more tendency to be prolonged than among birds. In the case of the marmot the young pass the whole winter in the same burrow with their parents. Take also the case of the roe-buck (*Capreolus*). Rut takes place in April or in May, gestation lasts from eight to nine months, and the suckling young are three months old when the second rut takes place. These still remain six months with their mother and do not leave her until the birth of another offspring. In the roe-buck, says M. Trouessart, brothers and sisters have been seen to copulate and to remain together throughout their whole life. There are reasons drawn from the social state, to be learned later on, which lead us to believe that between the moment when the young are emancipated, particularly from their mother, and that at which they reach puberty, the bond is less broken than among birds. But what is certain is that in both the first rut breaks definitely this bond, and that among mammals as among birds no

trace of affection survives between parents and young. They no longer recognise one another.

Conclusions. The family, in the vertebrates, is nothing but one of the phases of the reproduction of the species—its outward terminal phase. It solves for animals the problem of the development of individuals during the interval which separates the rupture of the egg from the moment where, being able to take care of themselves, they have only to reach puberty.

Bi-sexual generation, outlined in the highest protozoans, has been pronounced by the accidents of evolution to be the form most favorable to the reproduction of constituted types, that is to say, of species. Instead of leaving the sexes united in one and the same solidarised colonial individual, adaptation obeying the law of specialisation of functions has separated them and lodged them in different individuals. A difficult situation resulted,—that of two individuals having the same rights to the proprietorship of the resultant offspring, and the same physiological obligation of caring for their development. In some invertebrates the question is simplified: the male dies when he has fulfilled his indispensable rôle. In this uncertain epoch in the history of successive creations, where the fishes and the reptiles are born and differentiated, there are traces of hesitation. The hatched eggs perish for want of care in large quantities. Here was the opportunity for selection. The egg having been laid and fecundated, or fecundated and laid, who should assume charge of its outward development—the male or the female? In the birds and the mammals, the solution has been reached,—it is the female. Organic and psychical impulses have been created in her as the result of the law of utility: the best survive, the poorest perish. But seeing that the male does not disappear after having fulfilled his necessary rôle, why is not some use made of him? Analogous impulses to those formed in a female, prompting him to share with her the family burden, are then produced. But we have seen that adaptation has not attained absolutely identical results in the birds and the mammals. In the majority of the former, the male, prompted by a high sensibility, has become an excellent *pater familias*. In the majority of the latter,

adaptation has gone afield ; the sensibility of the animal has labored under disadvantages ; the egoistic impulse has gained the upper hand over the altruistic impulse. And this stands to reason. The female, passive by nature, has uniformly yielded to sensibility from her earliest origin in the protozoan cells ; the male who has been active since the same period has been confirmed in his consciousness of will and of initiative. He has retained the active rôle in rut. He has also remained active in the majority of mammals in the sense of seeking to possess and to have around him as many females as possible. While from a different aspect of the same egoism the Carnivora have become monogamous, the majority of the Ungulata, of the marine animals, and of the monkeys have become polygamous. The goal is thus missing here towards which adaptation has so successfully proceeded in birds. The conjugal union, instead of being an altruistic association having in view reproduction, is the supremacy of the male over one or several females. The family, instead of being confined to one female and to a reasonable number of young which could be reared and protected, is a clan of which the male is the chief. Polygamy in the Ungulata is a digression of adaptation. If it still persists in the Monkeys, it is because it has not been able to regain the straight path. In the anthropoids, it is true, the scene is changed, and these animals have again become monogamous.

It remains for us to see what influence the various groups connected with the family and also the family itself have exercised on the formation of animal societies,—a study which will carry us to the last chapter of this part.

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THE PROBLEM OF GOOD AND EVIL.

THE ERA OF SUBJECTIVISM.

BY far the most important problem for philosophical, religious, and moral consideration is the question as to the nature of evil. The intrinsic presence of suffering is the most obvious feature that determines the character of existence throughout, but gives at the same time origin to the most important blessings that make life worth living. It is pain that sets thoughts to thinking: a state of undisturbed happiness would make reflexion, inquiry, and invention redundant. It is death which begets the aspiration of preserving oneself beyond the grave. Without death there would be no religion. And it is sin that makes virtue a necessity. If there were no going astray, there would be no seeking for the right path; there would be no merit in goodness. Blame and praise would have no sense. In the absence of want, imperfection, and all kinds of ill, there would be no ideal, no progress, no evolution to higher goals.

Mythology being always a popular metaphysics, it is a matter of course that the idea of evil has been personified among all nations. There is no religion in the world but has its evil spirit who represents pain, misery, and destruction. Buddhists call the personification of evil *Mâra*, the tempter, the father of lust and sin, and the bringer of death. The Persians call him *Angra Mainyu* or *Ahriman*, the demon of darkness and of mischief, the Jews call him *Satan* the fiend, the early Christians, Devil (*διάβολος*), i. e., slanderer, because, as in the story of Job, he accuses man, and his accusations are false. The old Teutons and Norsemen called him *Loki*. The

demonologies of the Japanese and Chinese are perhaps more extensive than our own.

The evolution of the idea of evil as a personification is one of the most fascinating chapters in history and it would be humorous if most of its pages (especially those on witch prosecution) were not at the same time very sad. The pedigree of the Evil One is older than the oldest European aristocracies and royal families; it antedates the Bible and is more ancient than the pyramids. We have treated chapters of it in outline in another place¹ and shall not attempt to recapitulate them, but limit ourselves to the philosophical consideration of the idea of evil; and here we are first of all confronted with the problem of the objective existence of evil.

The question presents itself: "Is not evil the product of mere illusion? Is it not a relative term which ought to be dropped as a one-sided conception of things? Does it not exist simply because we view life from our own subjective standpoint, and must it not disappear as soon as we learn to comprehend the world in its objective reality?" The tendency to regard evil as a purely negative term is at present very prevalent, for it agrees with the spirit of the times and is one of the most popular notions of to-day.

In ancient times man was in the habit of objectifying the various aspirations and impulses of his soul. In order to understand beauty the Greek mind fashioned the ideal of Aphrodite, and the moral authority of righteousness appeared to the Jew as Javeh the Lord, the Legislator of Mount Sinai. Religious aspirations were actualised in the Church by means of ceremonials and ecclesiastical institutions.

Things changed at the opening of that era in the evolution of mankind (commonly called modern history) which was prepared through the inventions of gunpowder, the compass, and printing, and began at the end of the fifteenth century with the discovery of America, and the Reformation. The more the horizon of the known world grew, the more man began to comprehend the importance of his own subjectivity. The tendency of philosophy since Descartes

¹ See *The Open Court*, Nos. 421, 422, 424, 426-428, 430, 449, 450-453, 456-460.

and of religion since Luther, has been to concentrate everything in man's individual consciousness. That alone should have value which had become part of man's soul. Man's consciousness became his world, and thus, in religion, conscience began to be regarded as the ultimate basis of conduct. Men felt that religion should not be an external, but an internal factor. Toleration became a universal requirement, and subjectivity was made the cornerstone of public and private life. Thus the era of the Reformation showed itself as a revolutionary movement which, proclaiming the right of individualism and subjectivity, overthrew the traditional authority of an external objectivity.

The originators of this movement did not intend to discard all objective authority, but the spirit of nominalism which dominated them prevailed over their movement in its further progress. The last consequences of the principle of subjectivity which starts with the famous assumption *cogito ergo sum* were not anticipated by Descartes, for he naïvely assumes objective existence on one of the most trivial arguments. Nor would Luther with his peculiar education and stubborn narrowness which were by no means inconsistent accompaniments of his greatness, ever have endorsed later theories based upon the purely subjective aspect of conscience; but the fact remains that the last consequence of the recognition of the supremacy of the subjective principle is a denial of any objective authority in philosophy, politics, religion, and ethics, which leads in politics to anarchism, i. e., individualism pushed to its extreme; in philosophy to agnosticism, i. e., the denial of any cognisable objectivity worked out most systematically in Kant's critical idealism. In ethics it is the refusal to recognise any objective authority in morals; which leads either to Bentham's ethical egotism and hedonism or to intuitionism.

Our present civilisation is based upon the Protestant ideal of individualism, and nobody who lives and moves in our time can be blind to the enormous benefits which we derive from it. Nevertheless, we must beware of the onesidedness of subjectivism. Objectivism is not so utterly erroneous in principle as it appears from the point of view of modern subjectivism. The external methods of

the Roman Church are mistaken ; the tyranny of its hierarchical system which substitutes the priest's authority and an infallible papacy for God's authority is radically wrong ; and the main task of Protestantism consisted in protesting against this authority, which, in spite of its self-asserted catholicity, is based upon human authority of fallible mortals, an authority that was more frequently misused through bigotry and ignorance than from malice and selfishness.

There are Protestants who might object that Protestantism is not merely negative ; it is also positive. It is not only a protest, but also an affirmation. True, indeed ! But most of the Protestant affirmations are simply relics of the old Romanism which bound the consciences of man and crippled his reasoning power. The fanatics among the Protestants are by no means friends of liberty and free inquiry ; and the positive power, the new factor in history that was destined to build up a new civilisation, was nothing else but science. Therefore, Protestantism is not as yet the last word spoken in the religious development of mankind. We must look to higher aims and more positive issues, and a new reformation of the Church will obtain them only on the condition of its again recognising the importance of objectivity.

Mankind will not return to the dogmatic system of hierarchical institutions, which would only bind again the consciences of men by man-made authority, but the fact must be recognised that truth is not a mere subjective conception ; that truth is a statement of facts ; accordingly, that it contains an objective element, and that this objective element is the essential part of recognised truth.

In the old period of objectivism, the ultimate authority rested with great men, prophets, reformers, and priests, whose spirit, after it had been adapted to the needs of the powerful, was embodied in Church institutions. The new objectivism discards all human authority ; it rests ultimately upon science, which is an appeal to facts. Truth is no longer what the Church teaches, or some infallible man may deem wise to proclaim, nor is it what appears to me as true, or to you as true ; but that which according to methodical critique is proved to be objectively true, so that everybody who investigates will find it so.

Objective truth, demonstrable by evidence and capable of revision, or, in a word, science, is the highest, the most reliable and the most valuable revelation of God. God reveals himself in the facts of life, among which we include our afflictions and personal experiences, God speaks in our conscience, which is, as it were, the moral instinct, the result of all our inherited and acquired experiences, and this is the reason why the voice of conscience makes itself heard in our soul with that automatic force which is characteristic of all deep-seated subconscious reactions. God also appears in our sentiments, our ideal aspirations, our devotions, our hopes and our yearnings. All these various manifestations are important and must not be lost sight of, but above them all is the objectivity of truth which speaks through science.

It is impossible for all men to be scientists, but for that reason it is not necessary to enslave their minds and hearts by blind faith. The faith of every man should be the trust in truth, not in fairy tales that must be taken for granted, but in the truth,—the truth which in its main outlines is simple enough to be comprehensible by all,—the truth that this world of ours is a cosmic harmony in which no wrong can be done without producing evil effects all around.

Faith in the objective authority of truth is the next step in the religious evolution of mankind. We stand now at the threshold of the third period which will be, to characterise it in a word, an era of scientific objectivism. The tendency of the second era was negative, revolutionising, theorising; the tendency of the third will be positive, constructive, practical.

Negativism and subjectivism appear from the standpoint of the positivism and objectivism of the first period as the work of the destroyer, of the negative spirit, the Devil. It is a reaction. This explains why Milton's Satan actually became a hero. Milton was a Protestant, a revolutionist, a subjectivist, and he unconsciously sympathises with Satan, who in the terms of a philosopher of the age declares :

" The mind is its own place and in itself
Can make a heaven of hell, a hell of heaven.

What matter where, if I be still the same
And what I should be."

The negativism of the second period is not a mistake. It was an indispensable condition of the third period; for it manufactured the tools for a higher and better positivism,—criticism. But criticism is insufficient for positive construction; we must have actual results, methodical work, and positive issues; and the prophet of the twentieth century finds it necessary again to emphasise the importance of objectivity.

IS EVIL POSITIVE?

After these preliminary remarks we shall be prepared to understand why the tendency of subjectivism led to the proposition that evil is a mere negation, but no positive factor. And looking for the most characteristic representative of this view among the ablest authors of our time, we find a statement written by the well-known author of the novel *Ground Arms!* Bertha von Suttner, one of the most prominent advocates of universal peace on earth. She knows as well as Schopenhauer that the ills of life are positive, for she describes all the horrors of war in their drastic reality. Nevertheless, Bertha von Suttner devotes in her ingenious book *The Inventory of a Soul* a whole chapter to the proposition "The Principle of Evil a Phantom."¹ She says:

"I do not believe in the phantoms of badness, misery, and death. They are mere shadows, zeros, nothingnesses. They are negations of real things, but not real things themselves . . . There is light, but there is no darkness: darkness is only the non-existence of light. There is life, death is only a local ceasing of life-phenomena . . . We grant that Ormuzd and Ahriman, God and Devil, are at least thinkable, but there are other opposites in which it is apparant that one is the non-existence of the other. For instance: noise and silence. Think of a silence so powerful as to suppress a noise . . . Darkness has no degree, while light has. There is more light or less light, but various shades of darkness can mean only little or less light. Thus, life is a magnitude, but death is a zero. Something and nothing cannot be in struggle with each other. Nothing is without arms, nothing as an independent idea is only an abortion of human weaknesses . . . two are necessary to

¹*Inventarium einer Seele*, Chap. XV.

produce struggle. If I am in the room, I am here; if I leave it, I am no longer here. There can be no quarrel between my ego-present and ego-absent."

This is the most ingenious and completest denial of the existence of evil, and it is presented with great force. It is the expression of the negativism of philosophy from Descartes to Spencer. It seems to be consistent monism. And yet, we cannot accept it.

True enough, the idea of a personal Devil is as imaginary as a fairy, or an elf, or a hobgoblin; true also that there is no evil in itself, and no goodness in itself; the dualism of the Manichees is untenable. The evil principle cannot be conceived as an independent substance, essence, or entity. But for that reason we cannot shut our eyes to its real and positive existence. Granted that silence is the absence of noise; yet noise is not goodness, neither is silence badness. While I think or write, noise is to me an evil, while silence is bliss. Silence, where a word of cheer is expected or needed, may be a very positive evil, and a lie is not merely an absence of truth. The absence of food is a mere negation, but considered in the relation to its surroundings as an empty stomach, it is hunger; and hunger is a positive factor in this world of ours. Sickness can be considered as a mere absence of health, but sickness is caused either by a disorder in the system or the presence of injurious influences, both of which are unquestionably positive. A debt is a negative factor in the books of the debtor, but what is negative to the debtor is positive to the creditor.

If negative ideas were "mere abortions of human weakness," as Bertha von Suttner claims, how can mathematicians have any use for the minus sign? And if the idea of evil were an empty superstition, how could its influence upon mankind have been so lasting? On the one hand it is true that all existence is positive, but on the other hand we ought to know that existence in the abstract is neither good nor bad; goodness and badness depend upon the relations among the various existent things. And these relations may be good as well as evil. Some existences destroy other existences. Certain bacilli are destructive of human life, certain antidotes destroy bacilli. There are everywhere parasites living upon other lives, and what is positive or life-sustaining to the one is nega-

tive and destructive to the other, and every such negation is a reality, the effectiveness of which neutralises the action of another reality.

The idea of goodness is by no means equivalent with existence, and badness with non-existence. Existence is the reality; it is the indivisible whole, the one and all. Good and evil, however, are views taken from a certain given standpoint, and from this standpoint good and evil are features forming a contrast, but as such they are always actualities; neither the one nor the other is a mere nothing. The question is only whether *we* have a right to regard *our own* standpoint as the positive one representing that which is good, and all the powers that hinder human life as negative or evil.

The answer to this question seems to be that any and every being will naturally regard its own standpoint as the positively given fact, and every factor that destroys it as negative; his pleasure appears to him the standard of goodness.

And we grant that every being is entitled to take this standpoint, and that subjectivism naturally forms the initial stage of all ethical valuation. But we cannot rest satisfied with the principle of subjective autonomy as a solution of the problem of good and evil.

Supposing that good were indeed simply that which gives pleasure or enhances *my* life, and bad that which gives pain or threatens to destroy it, the standard of goodness and badness would be purely subjective. The famous savage-chief quoted by Tylor, and from Tylor by Spencer, would have fathomed the problem of good and evil when he declared that "bad is if anybody took away his wife, but if he took away the wife of some one else, that would be good." Good would be that which pleases *me*; and *the* good as an objective reality would not exist. There would be something good for me, for you, and for many others, but what might be good for me might be bad for you. Goodness and badness would be purely subjective qualities without any objective value.

The view which bases ethics upon a consideration of pleasure and pain and defines goodness as that which affords the greatest amount of pleasurable feelings is called hedonism. The coarsest

form of hedonism (as represented by Bentham) makes the pleasure of the individual supreme ; it bases its ethics upon selfishness, and sees in altruism only refined egotism. The altruist is said to love but himself in others.

Let me add here that the intuitionist basing ethics upon the voice of his conscience is, closely considered, also a hedonist, or at least a subjectivist, for he finds the ultimate authority of conduct in himself, viz., in the pleasure of those motor ideas of his which he calls his conscience : what he is pleased to consider as ethical, he thinks is ethical. His standard of morality is the subjectivity of his conviction which he is unable either to analyse or to trace to its origin. He differs from Bentham's hedonism of ethical egotism only in this, that the pleasure of his conscience overrules the lower pleasures of the senses.

Modern utilitarianism, as represented by Mr. Spencer, remains a purely subjective ethics, for it makes the greatest happiness of the greatest number, the maxim of ethics ; and by doing so it introduces no objective principle, but it simply proposes to replace every single subjectivity by the sum total of all subjectivities ; and subjective ethical maxims are not as yet truly ethical ; they remain on the level of the world-conception of Tylor's savage.

All subjective ethical theories fail to see the cardinal point of ethics, for the very nature of ethics is objective. If there is no objective authority of moral conduct, we had better openly declare that ethics is an illusion and what we call ethics is simply an arithmetical calculation in which pleasures and pains are weighed against one another and morality is at best only a dietetics of the soul. As a matter of fact, however, he who opens his eyes will see that there is an objective authority of conduct in life. Life and the factors in life are not purely what we make them. Here we are to run a race and the course of the individual as much as that of mankind and all living beings is prescribed in a very definite and unmistakable way on the lines of what since Darwin we have accustomed ourselves to call evolution. We must learn to recognise the necessity of progress which leads us onward on a straight and narrow path. Those who willingly obey the laws of progress advance on the path in

spite of its thorns, joyously and gladly. The reluctant are urged forward and feel the smart of nature's whip, while he who obstinately refuses to mind the laws of the cosmic order goes to the wall.

Nature has no consideration for our sentiments, be they pleasures or pains. Happy is he who delights in acting according to her laws. But he who seeks other pleasures is doomed. Look at the situation from whatever standpoint you may, the criterion of right or wrong, of good or bad, of true and false, lies not in the greater or lesser amount of pleasure and pain, but in the agreement of our actions with the cosmic order, and morality is that which is in concord with the law of evolution. Ethics teaches us to do voluntarily what after all we must do whether or not it may please us.

In a word, ethics is unthinkable without duty, and the essential element of duty is its objective reality, its inflexible sternness, and its austere authority.

We say to the hedonist, a good action is not moral because it gives pleasure, but because it accords with duty; and we must not look out for that which gives us pleasure but we must endeavor to find our highest pleasure in doing that which the cosmic law (or, religiously speaking, God) demands of us.

Those who deny that there is any objective norm of right and wrong in the universe, are inclined to claim with Huxley, that man survived not on account of his morality, but on the contrary, on account of his immorality. It has been said that man is more rapacious, more egotistical, more immoral than brutes. Without denying that an immoral man may sometimes appear more brutish than a brute, we cannot see that man is as immoral as or even more immoral than brutes. But the case is worth considering.

Says the wolf in Æsop's fable: "Why is it right for you to eat the lamb, when for me it is supposed to be wrong?" Is not man in the same predicament as the wolf, and does not mankind slaughter more animals than all the wolves in the world ever ate?

Granted that the wolf's pleadings are substantiated, we observe that man lives, but wolves are exterminated, which seems good evidence in favor of man being in greater accord with the cosmic laws. And yet the actions of both, the wolf and the man, seem to

be identical; or rather, if the blackness of a crime depended upon quantitative measurement by addition, we should have to decide in favor of the wolves; for man at the present time kills more sheep, pigs, and other animals in one year than wolves could devour in a century. What is the justification of slaughter in the one case, and what its condemnation in the other?

In answering this question we shall not idealise man's mode of living on the meat of his fellow creatures. For it appears that from a moral standpoint it would be preferable to sustain life without slaughtering lambs and calves, fowl and fishes. The case must not be considered from an abstract or ideal standpoint, but simply treated as a comparison of the wolf's conduct with man's conduct; and we find that the more sheep a man eats, the more he raises. The wolf eats them without raising them. The wolf murders the lamb. However, the slaughter of the lamb by man is no murder, for it serves to increase and to sustain human souls, and the souls of man possess more truth and a higher insight into nature. The lamb dies as a sacrifice on the altar of humanity, and this sacrifice is right and good if, and in so far as, it substitutes higher life for lower life. Subjectively considered the wolf has the same right as man to kill a lamb; and also the same right as the lamb would have to kill wolves or men. The difference of man's and the wolf's actions appears only when we take into consideration the objective conditions of man's superiority, giving him a wider dominion of power which he can maintain because his soul is a better reflector of truth than are the notions of a wolf.

We must insist here that the attainment of higher life, consisting in a fuller comprehension of truth and a greater acquisition of power, is one of the most essential requisites of morality. Morality is not a negative quality, but a very positive endeavor. We must abandon the old standpoint of negativism that goodness consists in not doing certain things which are forbidden. Genuine goodness consists in daring and doing; and in doing the right thing. One genuine and positive virtue atones for many sins that consist in mere omissions. The sheep is by no means (as is frequently claimed) more moral than the wolf. The wolf is bad enough, but he is at

least courageous and keen ; the sheep is a coward, and with all its cowardice it is stupid. It is time to discard the ovine ideal of morality which praises all lack of energy and of accomplishments as the highest type of goodness. What we need is a positive conception of virtue based upon a careful consideration of the requirements of life.

What higher life and lower life is cannot be declared to be an arbitrary distinction. It is not purely subjective, but can be defined according to an objective standard. Good to the savage is that which pleases him, and bad that which hurts him. Good, to him who has deciphered the religious mystery of the universe and understands the nature of God, is that which produces higher life, and bad is that which hinders, or perverts, or destroys it.

III. THE GOD-IDEA.

God is a religious term and it is often claimed that knowledge of God does not fall within the domain of science, the idea of God and all other religious terms are claimed to be extra-scientific. Thus there are two parties both of which are under the influence of nominalistic subjectivism : religious agnostics and infidel agnostics. The belief of the former is as irrational as the disbelief of the latter. If there is an objective authority of conduct, we must be able to know it ; we can obey it only in so far as we know it. Now experience teaches us that there is an authority of conduct, and the theory of evolution promises to prove it by positive evidence. This authority of conduct is called in the language of religion "God." Our scientists formulate under the name "laws of nature" that which is immutable in the various phenomena, that which is universal in the variety of happenings, that which is eternal in the transient, and every law of nature is in its sphere a rigorous authority of conduct which in this sense is a part and parcel of God's being.

The most important laws of nature in the ethical domain are those which regulate all the various and sometimes very delicate relations of man to man, which intercatenate our fates and set soul to soul in a mutually helpful responson.

Existence is one harmonious entirety ; there is not a thing in

the world but is embraced in the whole as a part of the whole. The One and All is the condition of every creature's being ; it is the breath of our breath, the sentiency of our feelings, the strength of our strength. Nothing exists of itself or to itself. All things are interrelated ; and as all masses are held together by their gravity in a mutual attraction, so there is at the bottom of all sentiment a mysterious longing, a yearning for the fulness of the whole, a panpathy which finds a powerful utterance in the psalms of all the religions on earth. No creature is an isolated being, for the whole of existence affects the smallest of its parts ; and in this sense the scriptural saying "God is Love" is a truth demonstrable by natural science.

Science proves that the whole of existence presents itself throughout as regulated by law ; that it is not a chaos, not an incomprehensible riddle, but a cosmos. As a cosmos it is intelligible, and sentient creatures can learn to understand its nature and adapt themselves to it. God is that feature in the world which conditions and produces reason ; and reason is nothing but a reflexion of the world-order. The cosmic order of existence, the harmony of its laws, its systematic regularity makes intelligence possible, and sentient beings will naturally develop into minds. God is that which changes individuals into persons, for reason and a rational will are the essential characteristic of personality.

Taking this ground we say (adopting here, for the sake of simplicity, the religious term God : those beings are good which are images of God.

The nature of progress is not (as Mr. Spencer has it) an increase of heterogeneity, but growth of soul. Evolution is not mere adaptation to surroundings, but a more and more perfect incarnation of truth. Adaptation to surroundings is, in an ethical point of view, an incidental blessing only of the power afforded by right conduct.¹

All facts of experience are revelations, but those facts which

¹ Cf. *Homilies of Science*, "The Test of Progress," p. 36, and "The Ethics of Evolution," p. 41.

teach us morality (man's conduct to his fellow-beings) embody truths of special importance. They exercise a wholesome influence upon the development of our souls, even though the primitive man was not able to fully understand the why and wherefore. In the lack of a clear comprehension of facts themselves, man's imagination clothes them in the garb of mythological imagery. In our own days the great teachers of morality are still regarded as the Indian regards the medicine-man, and the sacraments of the Church are treated like the totems of savages. Religion is now slowly passing out of the old stage of magic into the higher stage of a direct comprehension of facts. Myth changes into knowledge, and the allegory of the parable begins to be understood.

As astrology changed into astronomy, so the religion of miracles will give way to the religion of science.

We often hear God spoken of as good, and he is sometimes represented as goodness in general. But God is more than goodness. God is the objective reality of existence regarded as the ultimate authority of conduct. God is thus the standard of goodness; to call God good is an anthropomorphism. His creatures are more or less good, according as they are more or less faithful portraits of him, and as they obey his will. God is neither good nor bad, neither moral nor immoral, he is unmoral; yet, his nature and character is the ultimate criterion of goodness and of morality. And God's will can be learned from his revelations, which in the terms of science are called experiences, and which we formulate with exactness in what is called "the laws of nature."

God is not existence itself; He is not, either singly or collectively, the facts of the world; He is not the sum-total of objects or existences. God is that omnipresent feature in the facts, in the objects of the world, in reality, which commands obedience; God's will appears as that something in experience to which we have to conform. In a word, God is the standard of morality and the ultimate authority of conduct. This is *entheism*, but not *pantheism*, for it recognises the distinction between God and the All or sum-total of existence. It is *monotheism*, but not the old *monotheism*, for it no longer looks upon God as one individual ego being. Yet it pre-

serves the nucleus of the oldest conception of God, and accepts at the same time all that is true in pantheism.¹

God was always an idea of moral import. God was and will remain (so long as the word is retained) the ultimate authority of conduct. Since the order of the world in its most general features is of intrinsic necessity, which means that under no conditions could it be imagined otherwise, God is the *raison d'être* not only of the world as it actually exists but of any possible world; and in this sense entheism teaches that God is supernatural. Supernaturalism may be untenable as it was understood by dogmatists, yet there is a truth in supernaturalism which will remain true forever.

Those who see in the facts of nature only matter in motion, will naturally be surprised at the fact that a cosmos with living and morally aspiring beings can develop out of it. A deeper insight into the conditions of nature reveals to us that the world is a well regulated cosmos, having its own definite and immutable laws, and these laws are realities as much as material things. They are not concrete entities, but they are real, nevertheless, and indeed of greater importance than the existence of sense-perceptible objects. The cosmos is not only an enormous mass of innumerable atoms, and molecules, and masses of suns and stars, but its finer texture shows that down into its most delicate details it is a wonderful systematic whole, full of life and consistency, and possessing an outspoken and clearly intelligible character. The world possesses objectivity, i. e., it is a reality independent of what we think it to be. The world is not as we think it to be, but we must think the world as it is, and our duty is to act accordingly.

These are the plain facts of science which even the man who has no idea of science must mind. Only those creatures can in the long run of evolution survive who act according to the truth. Thus,

¹ *Entheism* is the doctrine that God is omnipresent in the world. *Pantheism* identifies God and the All. *Nomothetism* teaches that the laws of nature are not laws given by God as a lawgiver may issue ordinances, but that they are manifestations of God and as such parts of the Deity. *Monotheism* is the theory that there is one God, and monotheism is commonly understood to mean that this one God is a personal being.

the truth became embodied in moral rules, even before science could deduce or explain them. Religion is a revelation in so far as it is an anticipation of certain truths which were at the time of their invention still uncomprehended. Religious ideas, accordingly, had to be symbols, and could be communicated only in parables. Now, the more science progresses, the better shall we learn to understand the meaning of these parables.

God is in all things, but he is best revealed in man—especially in the morally aspiring man, and this is the meaning of the ideal of a God-man, or Christ,—a Saviour whose teachings are the way, the truth, and the life.

Jesus of Nazareth was, according to the latest and most searching historical investigations, a real historical person and not a mere myth of religious poetry, however much he was decked out with the same mythological tinsel ornaments with which all the greatest teachers of mankind, such as Zoroaster and Buddha, have been over-loaded. Yet, whether or not Jesus was a historical person is of little consequence; for the question is not whether Jesus of Nazareth lived 2,000 years ago, but whether Christ, the ideal of the God-man, the impetus of moral aspirations, is a living presence now. There are Christians whose Christianity is a mere Jesuism. Christians should distinguish between Jesus and Christ. Jesus taught the way, the truth, and the life, as he understood it; but Christ *is* the way, the truth, and the life; he is the ideal of goodness, of moral aspirations, of charity and love, as it finds its incarnation in man. He who believes in Jesus of Nazareth is not as yet free from paganism. He has the religion of the medicine-man, which is a belief in the magic power of Christian totems. He only who believes in Christ and lives like Christ has embraced Christianity,—the ideal Christianity that is free from pagan ingredients.

IV. THE EVIL ONE.

Evil personified appears at first sight repulsive. But the more we study the personality of the Devil, the more fascinating it becomes. The Evil One is in the beginning of his existence the em-

bodiment of everything unpleasant, then of everything bad, evil, and immoral. He is hatred, destruction, and annihilation incarnate, and as such he is the adversary of existence, of the Creator, of God. The Devil is the rebel of the cosmos, the independent in the empire of a tyrant, the opposition to uniformity, the dissonance in universal harmony, the exception to the rule, the particular in the universal, the unforeseen chance that breaks the law; he is the individualising tendency, the craving for originality, which bodily upsets the ordinances of God that enforce a definite kind of conduct; he overturns the monotony that would permeate the cosmic spheres if every atom in unconscious righteousness and with pious obedience slavishly followed a generally prescribed course.

The ingenuous question, "Why does not God kill the Devil?" is comical enough, because we feel instinctively that it is impossible. I know of a good old woman who prayed daily in devout fervor and great piety that God might have mercy and save the Devil. Think of it closely, and this attitude is touching! How many great theologians have seriously discussed the problem whether the Devil could be saved. Like that good old woman, they were so engrossed in the literal belief of their mythology that they did not see that the problem implied a contradiction. For God and Devil are relative terms, and God would cease to be God if there were no Devil.

The universe is such that the evolution of a higher life is possible only through great strain. The evolution of the warm glow of a soul out of the cold clay of the earth, of moral aspirations out of the fierce hatred that animates the struggle for existence, of intelligence, thought and forethought out of the brute indifference of that unthinking something which *we call* matter in motion, is due to extraordinary exertions; it is the product of work performed at the expenditure of enormous energy, and constant efforts are required merely to preserve the treasures already won. Difficulties to be overcome are called in the terminology of mechanics "the power of resistance," and this power of resistance is, closely considered, an essential and even a beneficial factor in the constitution of the universe.

If there were no power of resistance, if no efforts were needed to reach any end desired, if the world were pleasure and goodness throughout, we should have no evolution, no progress, no ideals; for all spheres of existence would float in one universal ocean of bliss, and all things would be intoxicated with heavenly delight.

Pain produces the want of something better, and deficiencies arouse the desire for improvement. If the feeling substance of mortals had all their wants satisfied without further exertion, man would never have risen out of the bythos of amœboid existence, and if the man of to-day lived in a Schlaraffia, he would not trouble about new inventions, progress, or any amelioration, he would simply live on in unthinking enjoyment. There would be no need of making any efforts, no need of struggling against evils, no need of virtue, no need of working out our salvation. There would be no badness, but there would be no goodness, either. All existence would be soaked with moral indifference.

Good is good only because there is evil, and God is God because there is a Devil.

As evil is not a mere negation, so the figure of Satan in religion is not an idle fancy. Goethe says:

“ Ich kann mich nicht bereden lassen,
Macht mir den Teufel nur nicht klein :
Ein Kerl, den alle Menschen hassen,
Der muss was sein ! ”

Now, let us look at the mythical figure of Satan as represented in theology, folklore, and poetry. Is he not really a most interesting man? Indeed, in spite of being a representative of all kinds of crimes, he possesses many redeeming features so as to be great and noble. According to the account in the second chapter of Genesis, Satan is the father of science, for he induced Eve to make Adam taste of the fruit of knowledge, and the Ophites, a gnostic sect, worshipped the serpent for that reason. Satan produces the unrest in society, which, in spite of many inconveniences, makes the world move onward and forward; he is the patron of progress, investigation, and invention. Giordano Bruno, Galileo, and other men of science were regarded as his offspring and persecuted on

his account by the Church. And when we glance over the records of Devil contracts, we learn to have respect for the old gentleman. Milton's Satan is a grand character, a noble-souled rebel, who would rather undergo an eternity of torture than suffer humiliation.

Consider but the fact that, taking the statements of his adversaries alone, the Devil is the most trustworthy person in existence. He has been cheated by innumerable sinners, saints, angels, and (according to various old church legends) even by the good Lord himself; and yet he has never been found wanting in the literal and punctilious fulfilment of all his promises; and all the bad experiences he has had in the course of millenniums have not in the least lowered his character. His mere word is honored like the holiest oath, or like the best signature verified with seals and legal witnesses. The instances are rare in which it is known that persons with whom he has had business transactions have requested him to sign a contract, to give a pledge, or to show any proof that he would honestly abide by his word; his honesty was never doubted by anybody. And mind you, it is not the Devil who boasts of his integrity, but this is the conclusion at which we arrive from the evidences adduced by his enemies.

Our sympathy for this martyr of honest conduct, the dupe of God and man, grows when we consider our own nature and relation to his Satanic majesty. With our hands upon our hearts, must we not confess that every one of us, with all our likeness to God, has some trait or other that makes us kin to the Devil? I do not mean here to make reference to actual sin or grievous transgressions, but to things of which we scarcely think of repenting. Did we never in an hour of humor laugh at our neighbor? Did we never joke at the cost of somebody else? Did we never bulldoze, tease, or tantalise our very best friends? Did we never enjoy the awkward situation in which some poor innocent had been caught? And why should we not? If we took away from life its satire, jokes, and other "deviltries," it would lose part of its most fragrant zest, and if we constructed a man consisting of virtues only, would not that fellow be the most unbearable bore in the world, wearisome beyond description? For it is a sprinkling of petty vices that makes even a great

man human. A mere ethical machine would neither be attractive nor arouse our sympathies.

The Devil is the father of all misunderstood geniuses. It is he who induces us to try new paths ; he begets originality of thought and deed. He tempts us to venture out boldly into unknown seas for the discovery of new ways to the wealth of distant Indias. He makes us dream of and hope for more prosperity and greater happiness. He is the spirit of discontent that embitters our hearts, but in the end often leads to a better arrangement of conditions. In truth, he is a very useful servant of the Almighty, and all the heinous features of his character disappear when we consider the fact that he is necessary in the economy of nature as a wholesome stimulant to action and as the power of resistance that evokes the noblest efforts of living beings. Indeed, the Devil is the most indispensable and faithful helpmate of God. To speak mystically, even the existence of the Devil is filled with the presence of God.

God, being the All in All, regarded as the ultimate authority of conduct, is neither evil itself nor goodness itself ; but, nevertheless, he is in the good, and he is in the evil. He encompasses good and evil. God is in the growth and in the decay ; he reveals himself in life, and he reveals himself in death. He will be found in the storm, he will be found in the calm. He lives in good aspirations and in the bliss resting upon moral endeavors ; but he lives also in the visitations that follow evil actions. It is his voice that speaks in the guilty conscience, and he, too, is in the curse of sin, and in this sense he is present even in the evil itself. Even evil, temptation, and sin elicit the good : they teach man. And he who has eyes to see, ears to hear, and a mind to perceive, will read a lesson out of the very existence of evil, a lesson which, in spite of the terrors it inspires, is certainly not less impressive, nor less divine, than the sublimity of a holy life.

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LITERARY CORRESPONDENCE.

FRANCE.

THE new work which M. J. E. Alaux has just published, *Théorie de l'âme humaine, essai de psychologie métaphysique*,¹ merits our best attention, and I shall make use of this occasion to call to the notice of our readers the works of a philosopher which I regret having hitherto neglected. M. Alaux is one of the veterans of French philosophy (he was born in 1828). Openly spiritualistic he yet repudiates the dualism of Descartes and the eclecticism of Cousin. "The reducing of matter," he writes in his introduction, "to indivisible, non-extended, and active elements, to forces, and the reducing of forces to a single force, constituting a substantial foundation supporting all things: unity of type, progressive production of life from inorganic nature up to the highest stages of the scale of life and to the loftiest reaches of intelligence—this monism, this evolutionism which I have presented to the public since 1860 has nothing whatever in it of the philosophy of Cousin." M. Alaux has caught up again the threads of Leibnitz's thought. The object of philosophy, according to him, is not knowledge, but the understanding of things, and its proper task is to furnish us with new demonstrations of old and long-existing truths. Psychology, metaphysics, mind, feeling, will, human life, eternal life—such are the titles of the studies touching the human soul which make up this work.

Soul, for M. Alaux, is an activity, a higher faculty of which the particular forms are either thought, will, or feeling, and of which

¹F. Alcan, publisher.

the general form is consciousness. Mind alone is known directly ; states of consciousness reveal the soul. Consciousness is not, therefore, a superadded phenomenon. The soul, however, has not the consciousness of being but the consciousness of acting, and it is in its actions that it recognises its being. It is not the "thinking thing," the conscious being of the Cartesians, but the capability of conscious acts ; it is conscious not of its capability but of the acts which are its realisation. Distinct from nervous action it remains as necessary as it is impalpable. The brain does not create it, but simply constitutes its medium.

One of the main aims of M. Alaux is to show that images are not the originals from whence general ideas are derived. Ideas, he says, are abstract ; images, that is to say, sensations, are concrete. It is true that we grasp things by their images ; but the idea bears a seal which cannot have come from sensation, and the author refuses to accept the doctrine that abstraction is contained in germ in sensation. Abstraction is in his eyes a work of the mind ; if the organ *sees*, the soul *perceives*. The mind possesses, consequently, "innate ideas" ; but M. Alaux makes here the following important distinction, that innate *ideas* are not innate *thoughts*, that the intelligible (idea) is not the representable (thought), and that if we think by innate ideas, we stand in need, in order to think them, of the experience which engenders them. Experience is thus the condition of the manifestation of ideas. Thought, in fine, does not shape things to fit its own moulds, as Kant would have it, nor does it shape itself to fit the moulds of things, as some empiricists maintain ; but the conformity of the two is derived from a far higher source—it is pre-established. The upshot of all this is that we apprehend multiplicity by unity and finiteness by infinity, etc. ; that the intelligible, which is the "necessary," gives us God, and that consequently we see God in things the same as we see the sun by its light whenever we look at illuminated objects. Lastly, the soul, according to these premises, is immortal, and M. Alaux thus builds up a doctrine of eternal life which is far removed from the rigorous Christian doctrine and which appears allied by the notion of evolution on which it rests, to Hindu thought.

Certainly M. Alaux shows with perfect distinctness the limits of science and the inextricable difficulties of empiricism ; and we cannot gainsay him the necessity of a *quid primum*, of a pre-established relation between the mind of man and the rhythm of things. But we may conceive this relation in a different manner from him, and in any event it would seem to me the proper course to stop at the recognition of this fundamental fact without venturing to draw all the deductions of philosophical spiritualism. I have set forth here more than once the reasons which prevent me from accepting the doctrine that man can mentally grasp the infinite, and I can only discover a logical artifice in the species of demonstration which M. Alaux values so highly.

As to the doctrine of immortality, M. Alaux has expounded it with the same distinctness which marks his setting forth of all the varied problems of spiritualism. The popular logic, however, will still always demand how it can be that creatures capable of doing evil are yet a manifestation of God, and the pessimists will not close their eyes to the miseries which follow in the train of man's heavy ascension towards the divine. The harmony of human feeling with human reason is a problem which no religion and no system of philosophy will boast of having solved. Even the belief in the survival of the soul cannot remove it ; and reason alone has no means of demonstrating to us that survival in the sense of the spiritualists.

* * *

The spiritists pretend to offer us experimental proof of it. Their number seems to be strongly on the increase and the accounts of their *séances* are very circumstantial. If we had the inclination, were it only from curiosity, to join this movement, which is to-day drawing to it so many disturbed souls and even inquiring scientists whose good intentions we cannot suspect, we should read with interest the French translation of a large work by a Russian spiritist, M. ALEXANDRE AKSAKOF, entitled *Animisme et Spiritisme*.¹

M. Aksakof has wisely arranged his facts in distinct categories. He studies first the so-called phenomena of "materialisation," then

¹ *Librairie des Sciences psychiques*. Leymarie, publisher, 1895.

he attacks the study of the "intelligent agent," which according to his contention is manifested in the phenomena of spiritism, and lastly, he sets himself the task of developing and justifying "the hypothesis of spirits." His critical and compilatory work has been conceived as a sort of answer to the objections formulated by Eduard von Hartmann. The latter does not deny all the facts of materialisation ; to explain them he admits that the nervous force of the medium is capable of producing dynamic effects and the effects observed would then be the result of that nervous force acting "at a distance." The subjective state of the participants, that is to say, hallucination, would accomplish the rest and be amply sufficient to explain the miracle.

Spiritists, as is natural, will hear nothing of hallucination. They maintain the objective reality of these phenomena, of which they claim to have demonstrative evidence by photographic records and material imprints. Although not admitting that all the effects produced are directly effected by the medium, who is simply the occasion of them, they yet believe in the real presence of spirits or phantoms.

I have had no personal experience in these matters and cannot therefore give an authoritative opinion of them. Nevertheless, the hypothesis of Von Hartmann appears to me insufficient to account for the various details of the phenomena, such as they are described ; besides, it is a risky one and is apt to carry the philosopher of the "unconscious" further than he is perhaps desirous of going. However, he has sought the explanation in the place where it is likely to be found—in a more complete knowledge of the nervous system. The part played by nervous action is certainly considerable in the phenomena of spiritism, if indeed it does not constitute it all. The believers are too hasty in evoking phantoms and in casting in old moulds the facts which they furnish us. The expectant attitude is perhaps more potent here than the simple state of faith. M. Aksakof personally writes with moderation and displays a prudence which is highly commendable. His frankness in the discussion does him honor, as does also his extremely sincere conviction.

An elegant little volume by M. EDMOND THIAUDIÈRE, *La Soif du Juste*, is the sequel of a series of *Notes of a Pessimist*, published under the titles of *La proie du néant*, *La complainte de l'être*, *La Décevance du vrai*.¹ I have not yet introduced this writer to our readers, but they will readily appreciate his merits. If M. Thiaudière expresses his doctrine in a dispersive form and gives us only "thoughts," he nevertheless possesses a philosophy which will appear sufficiently coherent after an attentive reading. I shall not reproach this author for his bitter sentences, nor do I desire to reopen the eternal discussion of optimism and pessimism. Whether or not we shall contest his right of imposing upon his conception of the world a "sentimental" color, and of seeing things, so to speak, under the angle of his own subjective feeling, we shall nevertheless soon gain the impression of his perfect sincerity, of his good will, and may perhaps end by declaring that after all he is a pronounced meliorist. He dwells too extensively upon the merits of kindness and on the superiority of altruism for a person that does not expect some amelioration of the lot of man from these sources. "There is," he writes, "something divine in the world for the reason that there is something divine in man; it is this divine that should be invoked and evoked."

The possibility of God, who "would be nothing less than the impersonal bond between things," the necessity of religion and of the cultivation of ideals, evolution of the spirit away from flesh and brutal appetite towards delicacy of sentiment, the solidity of moral law and of duty,—these are the strong points in the doctrine of M. Thiaudière. The doubt which he expresses touching the concepts of God and of soul, of liberty, and of survival after death, is productive of no doubt in practical action, and his philosophy presents as a result of these features a marked note of beneficence.

"Although the cruel play of nature," he says, "tends to demonstrate that divine justice is only a sublime dream of man, it is nevertheless the best plan to count upon it." He reaches thus the following thought: "Those who do not believe in God know per-

¹L. Westhausser, publisher.

fectly well that even if God does not exist yet things go on exactly as if he did exist, for no one can trespass with impunity upon the established order." I, too, have held that the order which reigns in the world gives us merely a sort of mechanical justice, for which it is the duty and lofty ideal of humanity to substitute a moral justice. In this point, therefore, I subscribe to the doctrine of M. Thiaudière, and I do not think we can invalidate the moral lesson which he presents to us in the following ingenious form: "*L'immoralité donne souvent de beaux acomptes, mais toujours elle se solde par un passif énorme.*"

In fine, M. Thiaudière is a genuine thinker. Those who do not know him will be glad that I have called their attention to his name and writings.

* * *

The work of M. JACQUES LOURBET, *La femme devant la science contemporaine*,¹ is written with all the fervor of youth and is loaded with facts. But I fear the author has not really "seen" the problem of which he treats. He seems particularly bent on demonstrating that women are not animals, which we will grant him from the start, and he ends with claiming for them *absolute liberty*, which is a formula either terribly indefinite in extent or altogether harmless in its scope.

That women may possess genius, no one has ever doubted and numerous examples are witness of it. It is true that we do not find superior women who have been really the peers of superior men. But at bottom that is not of great importance and presents no real interest, except for psychological study. The sociological question is different. It is not requisite here to know whether a women is as competent as a man to plead before a legal tribunal, or to cut off a leg, nor even to decide whether from the point of view of mind the feminine sex is inferior to, equal to, or the equivalent of the male sex. No, the problem consists essentially in determining the social function of woman consonantly with her biological function. We may reject on this point the empirical solution of history, but we

¹ F. Alcan, publisher.

cannot neglect it. How can we possibly maintain that evolution has with regard to one of the sexes been artificial in all places and from the commencement of time? The precise task of evolution, M. Lourbet will tell us, is to lift woman out of her humble sphere, to elevate her higher, and to break the constraints which now weigh down upon her. Undoubtedly woman must benefit by the general progress of the species, and it would be unjust to say that she has not benefited thereby very extensively. But let us not forget that evolution will never end in inverting the rôles of the sexes nor make of organisms which are physiologically distinct, organisms which are the same; and this organic distinction will always have consequences which the fanatics of woman's emancipation at present misunderstand, although they certainly must have some mental reservations upon the subject.

It is difficult to predict what will happen to-morrow in society; but one can foresee at least that the laws of nature will always intervene to redress the work of human laws which do not conform to nature. In all cases the question is, I repeat, not the discussion of useless superiorities, nor the systematic exclusion of women from all rights, nor dispensing with her necessary services and duties; but it is to find out within what limits and under what conditions it is profitable for society and useful for women themselves to extend the sphere within which her actions have hitherto been confined. The solution of the problem should be sought neither in absolute principles, nor in the arguments which exceptional instances offer; it can only be proportioned to the social medium, to the race, and to all the practical conditions of the period under discussion. "The roughest blow which can be delivered to the cause of the emancipation of women in France," said Madame Clémence Royer to me one day, "would be to grant them forthwith all the rights which their imprudent advocates claim for them."

* * *

I shall mention in concluding the new edition of a work by M. ÉMILE BOUTROUX, *De la contingence des lois de la nature*, a work purely dialectical in character; an *Etude sur l'espace et le temps*, by M. GEORGES LECHALAS, in which are treated with competence the

abstract questions of geometry and mechanics, the problems of "similar worlds" and of the "reversibility of the universe," which lead the author to a criticism of the notions of infinity and continuity; a curious work by M. L. DUGAS on *Le psittacisme et la pensée symbolique*, in which the author after having presented language as a simplification or abridged notation of thought shows that parrot-like mechanicalism of speech is the rock on which language stumbles, when words have become abstract and empty of all real contents.

In the list of historical works I have still to signalise a very complete edition by M. E. DREYFUS-BRISAC of the *Contrat social* of Rousseau, and finally an extremely learned work by M. ANDRÉ LICHTENBERGER entitled *Le socialisme au XVIII^e siècle*, wherein we can follow with lively interest the budding and encasement, so to speak, of the ideas and systems which are so profoundly at work in our modern societies.¹

LUCIEN ARRÉAT.

PARIS.

¹ The works last mentioned are published by Alcan. I may also note the French translation of a book by Count Leo Tolstoï entitled *Les Evangiles* (Perrin et Cie, publisher).

BOOK REVIEWS.

HERMANN VON HELMHOLTZ'S UNTERSUCHUNGEN ÜBER DIE GRUNDLAGEN DER MATHEMATIK UND MECHANIK. By *Dr. Leo Koenigsberger*, Professor of Mathematics in Heidelberg. Leipsic : B. G. Teubner. 1896. Pages, 58. Price M. 2.40.

The present pamphlet, which is the elaboration of an address delivered last year on the occasion of a memorial celebration in honor of Karl Friedrich, the rehabilitator of the University of Heidelberg, gives a rapid but lucid presentation of the scientific achievements of Helmholtz in everything relating to mathematics and mechanics. One gets from it a renewed and deepened sense of the tremendous comprehensiveness of Helmholtz's scientific activity, which in this respect has scarcely been rivalled by any inquirer of ancient or modern times, with the single exception, perhaps, of Aristotle. Many have exhibited greater acumen and genius in one or a few departments, but none have left the impress of originality and profundity on so many. Galileo, Huygens, Thomas Young, Faraday, J. R. Mayer, Lagrange, Gauss, possibly surpassed him in scope and significance of individual achievements, in classical elegance of presentation, or in philosophical grasp, but they have not rivalled his wonderful versatility which alternately resumed and elaborated nearly every province of positive, physical research. There have been some who have denied him genius of the purest and most unqualified type, but none can gainsay his having reached the pinnacle of consummate virtuosity. His name has drawn to itself and absorbed a preponderating share of the scientific achievements of the closing half of the nineteenth century, and like all overtowering personalities his fame will no doubt be handed down to posterity associated with performances in which others have taken no less distinguished and perhaps even more prominent a part. With few exceptions he is unconsciously accredited in all academical circles not only with the independent enunciation of the principle of the conservation of energy, that crowning generalisation of the science of our century, but even with its sole enunciation, and in the popular world the tendency is absolutely dominant, to accord to him the sole merit of its discovery. Impartial judges assert that Mayer, even barring the questions of independence and priority, which certainly belong to the Heilbronn physician, was, date for date, far ahead of Helm-

holtz in the philosophical appreciation of the principle. Certainly there can be no doubt of Mayer's merits and share in the original discovery. Yet Helmholtz's, not Mayer's, name will go down in popular imagination and history exclusively associated with the greatest scientific triumph of our age. Thirty years ago and more, his claims on the same head were, in an able article in the *English Cyclopædia*, entirely subordinated to those of Grove, who delivered his lecture on the "Correlation of Physical Forces" as early as 1842. Now, in the accounts of the discovery of the law, there is scarcely a mention of Grove—such is the increasing inertia of a scientific reputation. And as he overshadowed in this province Mayer, Joule, Carnot, and others, so, too, in his famous researches regarding the foundations of mathematics, in his great systematic investigations of physiological optics and acoustics, he naturally and by sheer force of his scientific ascendancy obscured or ingurgitated a goodly portion of the work of other equally meritorious inquirers.

But this is not strange. The same natural result has occurred in the case of all great historical and scientific personalities, and even of places, though in a less degree now-a-days than in the old mythical periods. It is an imperative social law. Legend and history attribute to Charlamagne all that was good and great in his time: Venice, Rome, and Troy¹ are the inheritors of all the glories and of the history of their namesakes; and so in a successively diminishing degree Pythagoras, Aristotle, Newton, Leibnitz, and Alexander von Humboldt have stood as the epitomes and incarnations of their scientific time, country, and domain. Gigantic maelstroms, they have sucked into their maws the philosophical and scientific driftwood of nearly the whole contemporary world!

One of the most embittered opponents of Helmholtz's title to genius and fame is Dr. E. Dühring, a highly independent, powerful, and versatile thinker, who many years ago conducted a battle royal with the authorities and faculty of the University of Berlin on the occasion of his being refused a chair of philosophy in that institution. In this encounter Helmholtz drew upon himself Dühring's undying wrath. Speaking of the confusion which exists in the popular mind regarding the intrinsic worth of the great scientists and thinkers of the world who by the vulgar are universally rated much lower than the fashionable authorities of the day, Dühring once cited as an instance a passage in Schlosser's *Universal History* where the well-known historian in a grandiloquent dash of rhetoric speaks of "the history of mathematics from Archimedes to Kästner!" Kästner, a professorlet in the last century at the University of Göttingen, whose main achievement was a tolerable history of mathematics, and Archimedes, the incarnation of the mathematical genius of antiquity! "Really," interpolates Dühring with fine derision, "One might as well speak of the history of physics from Galileo to *Helmholtz*!"

Contrasted with this exaggerated scorn we may place the present estimate of Dr. Koenigsberger, Professor of Mathematics in Heidelberg, which exhibits the

¹ See Carus Sterne's *Trojaburgen*. Glogau. 1893.

glorious plenitude of Helmholtz's work in but a single department. We read here of his philosophical discussions relative to the foundations of mathematics, which opposed the modern empirical view to the transcendentalism of Kant; of his physiological and psychological researches which furnished the foundations of his subsequent empirical theory of the origin of space and time; of his researches in the non-Euclidean geometry proper; of his application of the latter to colors; of his enunciation of the principle of the conservation of work; of his hydrodynamical and aerodynamical investigations; of his theory of vortices; of his researches in electricity; of his consequent examination of the fundamental principles of mechanics and the theorems resulting therefrom; and finally of his theories regarding the dynamic constitution of matter, the ether, etc. This last was the final work of his life, and we learn that the intended subject of his address at the meeting of the German physicians and inquirers in Vienna was actually "Permanent Forms of Motion and Apparent Substances." What the character of this address would have been is unknown, as only a few notes regarding it were found among Helmholtz's literary remains, but it is supposed that it would have elaborated the philosophical foundation of the extensive researches which he had been conducting in his last years regarding the basic principles of mechanics and physics and at which he had hinted in his Introduction to the *Mechanics* of Hertz. Of his achievements in this department, let us finally add, the reader will find in this pamphlet of Dr. Koenigsberger a concise and worthy account. A fine portrait of Helmholtz taken from the oil painting in the possession of Frau Ellen von Siemens, forms the frontispiece of the brochure.

THOMAS J. McCORMACK.

DIE UEBERWINDUNG DES WISSENSCHAFTLICHEN MATERIALISMUS. By *Wilhelm Ostwald*, Professor der Chemie an der Universität Leipzig. Leipsic: Veit & Comp. 1895. Pages, 36.

This pamphlet of thirty-six pages is a lecture which Prof. Wilhelm Ostwald, one of the most prominent chemists of Germany, and Professor at the University of Leipsic, delivered on September 20, 1895, before the Association of German Naturalists and Physicians at Lübeck. It is a protest against the materialism of science, and the author is fully aware that he has taken a position at variance with the opinions of many great scientists. He has the consciousness of a lookout whose duty it is to call "breakers ahead!"

The famous *Ignorabimus* of Du Bois-Reymond is in Professor Ostwald's opinion nothing but a protest against the mechanistic world-conception which is at present dominant in scientific circles. Ostwald does not seriously believe in the *Ignorabimus*, but claims that we have not as yet fully understood the salient point of the problem, for there are processes which are not representable by mechanistic equations, and this much is certain that we must give up the hope of interpreting the world as a mere play of atoms. Professor Ostwald proposes to replace mechanism by the energetic world-conception. The result of his investigation remains

at present negative. He calls attention to the fact that the pressure of gases is equal in all directions. The factors of electric energy, potential, and electrical quantities generally, such magnitudes as may be called polar, being representable not only by numbers but also by opposite signs which, when added, reduce two equal quantities to zero, are not known in mechanics, and this Professor Ostwald declares is the reason why we are unable to find a mechanical hypothesis for electrical phenomena. By reducing the laws of nature to analogous modes of an energy, the author hopes to attain to a science that would be free from hypothesis. Professor Ostwald finds a substratum of energy redundant, and believes that energy should, with the exception of time and space, be the sole magnitude for scientific equations. He does not enter into a discussion of the details of his world-conception, but considering that energy is expressed either in motion or in the possibility of motion, his philosophy is more mechanistic than his censure of the mechanistic world-conception seems to allow.

He concludes his lecture with the question: Is energy, indispensable and useful as it is for the comprehension of nature, indeed sufficient for this purpose, or are there phenomena which cannot be formulated in the hitherto known laws of energy? This question is briefly answered in the negative, and we may expect that Professor Ostwald will present his arguments on this head in future investigations. But we wish to state at once that the conception of energy is as little all-sufficient for the interpretation and explanation of nature, as are the conceptions matter or spirit. For there are phenomena in nature which cannot be reduced to energy. We ought to remember that energy, matter, space, and spatial relations, sentiency, including all subjective phenomena of soul-life, ideas, and all representative psychical images of mental life are different fields of abstraction. None of our generalisations will be found sufficient to serve as an all-comprehensive idea under which all phenomena can be subsumed. Monism should not become a single-substance theory. The principle of genuine monism is preserved when we bear in mind that the totality of nature is one indiscerptible entirety, and that our various conceptions are aspects of different features of reality. Professor Ostwald will find it impossible to explain the nature of ideas from any kind of energy, for ideas have nothing to do with energy. What has the notion of a mathematical line or circle to do with either pressure or motion, or with any mode of motion, be it electricity, light, or what not?

Professor Ostwald's lecture has created quite a stir in the scientific world, and it appears that he has been greatly misunderstood. He has been suspected of a hankering after unscientific notions of mystic and agnostic world-conceptions, but from the trend of the lecture it seems to us quite clear that the tendency of his thought is exactly the opposite. He wants to realise the ideal of a genuine positivism in which science would be a mere description of facts free from all hypothesis. Though the lecture does not propose a definite solution of the problem, and gives only a hint which in our conception does not lead in the right direction, we have

devoted so much space to its discussion because Professor Ostwald's thoughts are suggestive and will not fail to provoke a discussion of the most important problem of science, which, in brief, is the question, "What is the philosophy of science?"

P. C.

HERMANN GRASSMANN'S GESAMMELTE MATHEMATISCHE UND PHYSIKALISCHE WERKE.

I. Band. II. Theil. Die Ausdehnungslehre von 1862. Leipsic: B. G. Teubner. 1896. Pages, 511. Price, M. 16.

The task of publishing a complete edition of the mathematical and physical works of Hermann Grassmann was recently undertaken by the Royal Saxon Academy of Sciences, and the work of editing them has been entrusted to Friedrich Engel assisted by Jakob Lüroth, Eduard Study, Justus Grassmann, Hermann Grassmann, Jr., and Georg Scheffer. The first volume, which is now completed, embraces two parts: the first, the *Ausdehnungslehre* of 1844 (also containing the prize essay on geometrical analysis), has already appeared; the second, the *Ausdehnungslehre* of 1862, is that now in our hands. The relation of these two famous books will be better understood by a glance at Grassmann's life, which is interesting in more points than one, and whose contemplation is more apt to hold our attention than would be a difficult and abstract analysis of the contents of his works.

Hermann Grassmann, independent creator of a branch of mathematics which is accounted by some the most consummate piece of work in this direction that the present century has produced, was born (1809) and destined to spend his life in the German city of Stettin, commercially an important place and the central emporium of the German Baltic trade, but naturally bereft of the incentives and ideal environment which usually go to the formation of a scientific career. Grassmann, however, came of a talented family and one that remained talented. His two sons, Hermann Grassmann, now at Halle, and Justus Grassmann, at Brandenburg, have displayed unusual mathematical attainments.¹ His father also was a mathematical teacher of some note and had published a number of profound and original writings in which were contained the germs that determined the subsequent scientific bent of his son.

Hermann Grassmann first became a student of theology in Berlin and had among his teachers Neander and Schleiermacher, the latter of whom was not without influence upon his philosophical development. Now as afterwards his studies varied much, and even included the mathematical works of his father, but most of his work was done in philology. With interests comprehensive rather than vacillating we find him, shortly after taking his first theological examination, a teacher of mathematics in Berlin where he made the acquaintance of Jakob Steiner, whose epoch-making work on *Synthetic Geometry* had appeared two years previ-

¹ Note the former's *Punktrechnung und projektive Geometrie*, the second part of which, *Grundlagen der projektiven Geometrie*, appeared last Easter in the programme of the Latin Hauptschule, of Halle.

ously. A year or so afterwards, he returned to his native city where he was installed as teacher of various branches at the Ottoschule and where he devoted himself alternately to chemistry, crystallography, botany, mathematics, and philology. In the last branch he even published two small works, the forerunners of his later activity in this field. He had not yet given up theology, in fact he had passed at just this time his second examination for the preachship, but his previous studies for a teacher's diploma in mathematics had led his interests into different fields and these gradually and unconsciously brought with them the abandonment of his theological ambitions.

This was in 1839. In preparing for his full teachership in mathematics and physics, he read Lacroix, Lagrange, and Laplace, the study of the latter of whom suggested a treatment of the problem of the tides, taken as his thesis, in which he developed and applied new and greatly abbreviated methods of reckoning (1840). This was the germ of the new science, and it is interesting to note that it took its rise in connexion with a practical mechanical problem, as have many other branches of mathematics, and notably the Calculus of Variations.

From this time on, the fundamental ideas of the coming *Ausdehnungslehre* began to take a systematic shape in his mind. In 1842 he was called to the Gymnasium, and in the succeeding year to the Realschule. Now naturally his eye was bent upon a professorship in a university where his scientific ideas under the stimulus and correction of his colleagues, and in the clarification which results from their being communicated to others, would have a chance of unfolding and of being disseminated. But this was an ambition never to be realised.

His study of the works of Möbius and Poncelet which of any then existing had most kinship with his thought led to a paper in *Crelle's Journal* on the *Theorie der Centralen* which first displayed his wonderful powers of generalisation. In 1844 his famous *Lineale Ausdehnungslehre* appeared, which not only is the most important of his own works but is rated by competent critics as one of the most remarkable mathematical creations of all times. This is the first of the works mentioned at the beginning of this notice, and together with the prize-essay on Leibnitz's calculus of position, formed the first instalment of the present Teubner edition of his collected works.

It was an original creation; Grassmann's methods of reckoning were altogether novel; and the deduced laws had reference entirely to abstract constructions in extremely abstract domains. The terminology was strange. The argument was not developed in connexion with concrete data, not even with the data of space, although numerous geometrical and mechanical applications were appended to the theorems. Owing to its intrinsically limitless possibilities of application, the treatment of the author was signficatory rather than expository. In addition, it bore a philosophical stamp which was not common then in mathematical works. A meteor in the realm of scientific thought, it seemed to break all the traditions of evolutionary growth: it had no predecessor.

As an offset to this sudden and inexplicable appearance of the new science, Grassmann wrote for his book a preface which almost attained Galilean heights in its frankness and sincerity of character, and which gave a perfect insight into the workings of his mind. His plea for indulgence in this preface is an almost pitiable expression of his scientific seclusion and isolation.

On the book's appearance, no one seemed to grasp what the author was driving at. Gauss, Grunert, and Möbius considered it, but nothing at the time came from their outward sympathy. With the exception of one unimportant reference, not a single review or mention of it appeared in other works or magazines, save Grassmann's own *Selbstanzeige*, until the early seventies. Eight years after its publication Möbius remarked that Bretschneider of Gotha was the only mathematician he knew of that he read it through.

Appreciating the difficulties that beset the comprehension of his book, Grassmann set to work to unfold the practical capabilities of his method which he did in a long series of articles in the mathematical journals of Germany, all of which were signalised by great originality and acuteness, and on which his sole fame as a mathematician until the later years of his life rested. His failure again to receive recognition, however, soon resulted in his partially abandoning these studies, and caught by the enthusiasm of the year 1848, quite contrary to his natural disposition, he became for a while actively interested in politics. Then he took up the study of comparative philology, Gothic, Lithuanian, Old Prussian, Old Persian, Russian, and other languages. He published a grammar and reading-book of German.

In 1852, on the death of his father, he succeeded the latter as the first mathematician with the title of Professor at the Gymnasium of Stettin. Were it not for this change he would probably have given up physics and mathematics forever. Here, however, falls his important correspondence with Möbius, a number of important articles in the mathematical journals, a discussion regarding the priority of his method with Cauchy, and the efforts which he made and the prospects which were held out for advancement to a university professorship. Such a position was now highly desirable in the interests of a fruitful scientific activity. Pecuniarily it would have been a retrograde step, but the work at the Gymnasium demanded too much time and effort, and was too absolutely barren of the right kind of intellectual suggestion for his thought to yield its best results. He lacked students and hearers with whom he could inoculate his ideas and who would form a nucleus for their propagation. But the chance never came, although there were frequently promises and hope.

He was now again hard at work on the second part of the *Ausdehnungslehre*. Möbius and Grunert had complained of the predominantly philosophical form in which the first *Ausdehnungslehre* had been cast, and attributed its lack of success to this circumstance, which they regarded as repellent to the mathematical mind. At their suggestion, and by an incredible outlay of labor, Grassmann remodelled the work entirely, and presumably under the influence of his own impressions of

mathematical method gained in elementary teaching, but which were at variance with the growing mathematical taste of the age, gave to it a predominantly Euclidean form.

Such was the origin of the *Ausdehnungslehre* of 1862—the work which is now before us. Two opinions obtain regarding its value in a methodological aspect as compared with the *Ausdehnungslehre* of 1844. Victor Schlegel, friend and disciple of Grassmann and a prominent elaborator of his ideas,¹ while admitting the prodigious importance of the new conceptions contained in it, is of opinion that the work suffered unspeakably by its being recast into its Procrustean Euclidean mould. It had not been inexact in its original form, nor did its foundations lack logical stability. Its drawback had been simply a want of practical illustrations. This want had, it was true, been richly supplied in the second edition, which abounded in analytical and geometrical applications, and which contained a new and extensive chapter on the theory of functions, untouched in the original work, and which was a veritable incubator of the germinal ideas at the basis of many modern branches of mathematics like the theory of determinants and certain recent extensions in algebra. The treatment, however, was fragmentary and disjointed. Its unnatural, stiff Euclidean movement obliterated the psychological landmarks which are so necessary for our guidance in re-making the intellectual conquest of a new and untrodden province. The mastery of a single demonstration, says Schlegel, required as much effort as the comprehension of a whole chapter of the *Ausdehnungslehre* of 1844. But worst of all, the possibility of a broad mental survey, of a comprehensive *aperçu* of the development as a whole had been entirely lost. These circumstances, according to Schlegel, were directly accountable for its failure, which was even more complete than that of its predecessor. Friedrich Engel, on the other hand, the editor of the edition before us, regards the *Ausdehnungslehre* of 1862 as a distinctive advance upon that of 1844—an advance exhibited not only in its greater variety and richness of contents, but in its entire formal construction. According to him, the foundations of the *Ausdehnungslehre* of 1844, although brilliant in their suggestiveness, were not unequivocally established. Its fundamental conceptions were too general and philosophical in character and consequently too devoid of palpable contents, to form a solid and trustworthy substructure for a practical working-system. Tacit assumptions were necessary for its logical application and development, all of which was remedied in the second work, and the necessity of the same demonstrated by the consequent enormous extension of the scope and utility of the new method.

But with whomsoever the truth may lie, certainly the failure of the book could not have been more absolute. The work was nowhere reviewed, nowhere mentioned. Grassmann's attempts to obtain a university position again failed. The

¹ See his pamphlet *Hermann Grassmann, sein Leben und seine Werke* (Leipzig: F. A. Brockhaus, 1878), a vivid and adequate sketch of Grassmann's life and career.

dream and ambition of his youth melted away. And now this sorrowful spectacle is presented to us. At the advanced age of fifty-three he laid aside the studies which were soon destined to make his name one of the most famous in Europe and began a fresh career with unbroken heart and undampened hope. He took up the study of Sanskrit. The vigor and unweariedness with which he devoted his energies to the new work were marvellous when we consider his age, disappointments, and the diametrically opposed character of his previous studies and habits of thought. But more marvellous was his success, which is an astonishing testimony of the versatility of his genius and talents. Here that reward, which had been denied him in his chosen and natural field of effort, crowned his endeavors. From the early sixties until shortly before his death in 1877 he worked successfully at two tremendous undertakings, a *dictionary* and a *translation* of the Rig-Veda—at a time when the material and helps for such work were extremely meagre. His first recognition in the academic world came to him as a philologist not as a mathematician. Not to mention other honors, he was elected a member of the American Oriental Society, as he also found here one of his first few individual recognitions as a mathematician.

In the meantime, however, attention had in various mathematical quarters been directed to the *Ausdehnungslehre* of 1844. Hankel, then a young Privatdocent in Leipsic, had sought to bring it to the fore. Through Clebsch he was elected a corresponding member of the Göttingen Society of Sciences. Mention of him became more and more frequent. Preyer based upon his work a new theory of sensations. Schlegel elaborated in detail some of the principles of the *Ausdehnungslehre* and now actually a demand for the book arose, the first edition of which by a horrible irony of fate was reported by the dealer to have been *exhausted*. No one could account for this silent but terrific demand for the book until it was discovered that the whole edition had been used to satiate the *Wissensdurst* of a paper-mill. Yielding to the solicitations of his friends, therefore, Grassmann set to work at the preparation of a new edition, which he completed just shortly before his death (1877). Several important mathematical and physical papers also were published in this period of his incipient fame, which now dawned with full glory upon him as his life closed.

A note of bitterness and regret pervades our contemplation of Grassmann's life, for we are constrained to wonder what would have been its fruits had he found a more fitting and congenial sphere for the exploitation of his abilities, and had his energies not been scattered over so many fields. But that note of bitterness, however justified its cause, was never marked in his own career, which was one of complaintless serenity and of unceasing devotion to duty and to science. His unselfishness was requited by the love and confidence of his students, colleagues, and townsmen, in whose social, intellectual, and artistic advancement (he was a musician of ability, too,) he took no mean share. In this modest civic sphere his talents shone with unconsciously heightened lustre.

There remain of Grassmann's works, presumably to be comprised in this series, twenty-four mathematical papers published in *Crelle's Journal*, the *Mathematische Annalen*, the *Proceedings of the Royal Society of Sciences of Göttingen*, and *Grunert's Archiv*; three separate treatises on elementary mathematics, mechanics, and the relation of the *Ausdehnungslehre* to the non-Euclidean geometry; and finally, seven papers on various branches of physics. We have merely to add that the present volume, the *Ausdehnungslehre* of 1862, is printed in unusually good form, is richly supplied with annotations by the editors, and that in all cases where changes have been made in the text, an exact transcript of the original passages is given in an Appendix. A good index also adorns the work. THOMAS J. MCCORMACK.

TRACTATUS DE INTELLECTUS EMENDATIONE. Translated from the Latin of Benedict de Spinoza by *W. Hale White*. Translation Revised by *Amelia Hutchison Stirling, M. A.* (Edin.). New York: Macmillan & Co. Pages, 62. Price, \$1.00.

The *Tractatus de Intellectus Emendatione* was one of the earliest works of Spinoza. We learn from the excellent Preface of the translator that Spinoza in a letter to Oldenburg in 1661 mentions having written a *complete* little treatise on the subject of the amendment of the understanding but had delayed the publication of it on account of the rancor of the theologians. As there is nothing in the present *Tractatus* answering to the points which Spinoza mentions as having developed there, the conclusion is natural that the original editors of the present work had in their hands only the first draft of the completed treatise, a conjecture confirmed by the fact that in the form in which we now have it, there are numerous gaps, lost references, and marked crudities and ambiguities of style. Besides, the conclusion is totally missing.

The purpose of the treatise is the discovery of the highest good and is thus moral not speculative. But the method itself is speculative, for according to Spinoza's view although speculation is not in itself the goal, it is yet the way by which the goal is to be reached. Consequently, for attaining the highest good, the reformation of intellectual procedure is the first thing to be taken in hand, and Spinoza accordingly describes his four modes of arriving at knowledge, all of which are now perfectly familiar to students of philosophy. Afterwards he takes up the problem of certainty and handles it in an interesting manner. "How do I know that I know?" "How am I sure that all science is not a delusion?" In all such interrogations he detects "the sophistry of the infinite regress." "If it be necessary that I should know that I know, it is necessary that I should know that I know that I know."

Interesting is his application of the same sophistry to prove that no tool which men use could ever have been invented. "It is the same with tools; and the argument proceeds in the same way. For example, in order that iron may be 'forged, we need a hammer; and if we are to have a hammer, we must make one.

"To this end we need another hammer and other instruments; and to obtain these we shall need other instruments and so on *ad infinitum*. Thus anybody might fruitlessly endeavor to prove that men are unable to forge iron. But inasmuch as men at the beginning, with instruments furnished by nature, were able to make certain very easy things, although with great labor and imperfectly, and with these, when they were finished, made other and more difficult things with less labor and more perfectly, and thus by degrees, advancing from the most simple productions to tools, and from tools to other productions and tools, were able to accomplish with small labor so many and such difficult things, so also the intellect, by its own native force, forms for itself intellectual instruments by which it acquires additional strength for other intellectual works, and from these works, other instruments or power of further discovery, and thus by degrees advances until it reaches the pinnacle of wisdom. That this is the way in which the intellect proceeds will be easily seen, provided only we understand what is the method of investigating the truth, and what are those instruments furnished by nature which alone are required for the production of other instruments from them in order to advance further."

Afterwards, follows a discussion of true or adequate ideas, of ideas of fancy, of false ideas and doubtful ideas. The second part of the method consists in "laying down rules whereby unknown things may be perceived in accordance with the standard of the true idea." The treatise breaks off abruptly with the remarks supplied by the old editors—*Reliqua desiderantur*. Nevertheless, as the old editors remark, despite the defects in the book, "it contains much that is remarkable and useful and not a little profitable to the sincere inquirer after truth." The unsigned preface preceding the translation is a lucid and exemplary piece of work.

The price of the book is rather high.

T. J. McC.

ON GERMINAL SELECTION. By *August Weismann*. Chicago: The Open Court Publishing Co. 1896. Pages, xii, 61. Price, 25 Cents.

Professor Weismann's Essay on *Germinal Selection*, which was originally an address delivered before the International Congress of Zoölogists at Leyden, in September last, appeared first in *The Monist* for January, 1896, and not until afterwards in its original German version. In its present form it has been enriched by an appendix of thirteen pages discussing the history, bibliography, and present status of such questions as natural and chemical selection, variation and mutation, definitely directed variation, ultimate vital units, utility, internal evolutionary forces, etc., and further by a preface of twelve pages in which Professor Weismann sets forth his views on the method of scientific research, and defends the principles by which he has been guided in the elaboration of his theory of heredity and of his present doctrine of Germinal Selection. With regard to Germinal Selection itself, little need be said here, as its details are presumably already familiar to our readers. Its object is a rehabilitation of the principle of selection which outwardly seems

endangered by the upshot of recent researches, and the demolition of which would in Weismann's view be synonymous with the renunciation of all inquiry concerning the causal relation of vital phenomena. "Knowing this factor," he says, "we remove, it seems to me, the patent contradiction of the assumption that the general fitness of organisms, or the adaptations *necessary* to their existence, are produced by *accidental* variations—a contradiction which formed a serious stumbling-block to the theory of selection. Though still assuming that the *primary* variations "are "accidental," I yet hope to have demonstrated that an interior mechanism "exists which compels them to go on increasing in a definite direction, the moment "selection intervenes. *Definitely directed variation exists*, but not predestined "variation, running on independently of the life-conditions of the organism, as "Naegeli, to mention the most extreme advocate of this doctrine, has assumed; on "the contrary, the variation is such as is elicited and controlled by those conditions "themselves though indirectly."

Interesting and valuable to scientists who have not pondered deeply on the ways of their work, are his remarks on the rôle of imagination in research and on the function of theory. He claims for his determinants and ids the same position in biological theory that Maxwell claimed for his mechanical fictions in the province of electricity. He regards them merely as representative models or pictures, or rather as analogues, by the manipulation of which we can mentally follow out the course and development of nature. If our theories serve this end, they have fulfilled their purpose. He contends there is absolutely no other choice left for us in the field of heredity. The problem is too minute for developmental mechanics ever to think of mastering it. In the place of facts impossible to observe, therefore, he claims to have put a theory based on facts, by the mutual interaction of which the approximate truth will be reached.

The value of the pamphlet, which appears in a very cheap but substantial form, as a number of the Religion of Science Library, is enhanced by the addition of an index. T.

INDUCTIVE LOGIC. By *Wm. G. Ballantine*, President of Oberlin College. Boston and London: Ginn & Co. 1896. Pages, 174. Price, 90 cents.

The student of logic must not expect to find in this booklet by the President of Oberlin College an exhaustive and original examination of the principles of inductive reasoning, but simply an attempt to "reproduce some of the excellencies" of Dr. Fowler's "bright and interesting" work, the *Elements of Inductive Logic*, while essaying to substitute a sounder analysis of fundamental principles. The manner in which the book has been compiled is based upon that of most of the newer textbooks of logic, such as *Jevons*. Numerous extracts from scientific treatises have been cited as practical examples of reasoning and the discussion of the principles based upon the data therein found. These extracts are well chosen and eminently designed to enliven and diversify the study of the subject. In the presentation of

his points, whether original or borrowed, Mr. Ballantine is concise and clear, Altogether, the book is well adapted to intermediate academic instruction, although at the particular elementary stage of the educational course for which it is most suitable, most pupils have not yet attained a scientific grasp and breadth of vision which makes such a study a profitable undertaking. Into the author's points of logical doctrine we cannot enter.

μκρκ.

BUDDHISM IN TRANSLATIONS. By *Henry Clarke Warren*. Cambridge: Harvard University. 1896. Pages, 520. Price, \$1.20.

Mr. Henry Clarke Warren's book on Buddhism, will at once take a prominent place among Buddhistic publications. It is the first systematic collection of original translations from the southern canon of Buddhistic Scriptures, including not only passages of those books which have become accessible through the translations of other Pali scholars, but also new materials, for instance, selections from the *Visudhimagga* which had to be translated from manuscripts.

While Mr. Warren's book is to be recommended as an indispensable *vade-mecum* to all those who for one reason or another are interested in Buddhism, we must here state at once that the uninitiated will, naturally and necessarily, encounter great difficulties, for to appreciate the book one ought to understand the conditions under which Buddhism originated and the significance of the terms *âtman*, *karma*, *nirvâna*, etc., not only in their etymologies and definitions but also in their emotional potencies. *Nirvâna* may correctly be translated by extinction, but the word extinction does not find that same echo in our souls as *nirvâna* does in the souls of Buddhists to whom it is identical with a radical extinction of evil, sin, iniquity, pain, passion, hatred, and selfishness, which is regarded as the establishment of the highest bliss imaginable. *Nirvâna* corresponds to the Christian "heaven," yet it would be a mistake to translate it by the word "heaven"; for that which is commonly thought of when we speak of heaven, an eternal jubilee and glorification of God, would not be regarded as the highest bliss by Buddhists. There may be, and there are, according to Buddhist conceptions, inhabitants of heaven who have not as yet attained *nirvâna*.

Mr. Warren has translated *âtman* by "ego," and sometimes by "self," and these words are the best rendering that can be found; but we must always bear in mind that *âtman* according to the definition of the Brahman philosophy in *Buddha's* days meant the "self" in the sense of an immutable, eternal soul-essence of man. The *âtman* was supposed to be that essential part of the soul which remains the same in all changes, and conditions the identity of a person; it was thought to be the soul itself, and was regarded as a distinct being, distinct from all faculties of the soul and distinct also from all soul-activity. Since Buddhism teaches that nothing is stable in this world, it naturally denies the existence of an *âtman*.

Buddhism, of course, does not deny the existence of an ego in the sense of the existence of self-consciousness. It only denies the metaphysical assumption that

the unity of man's self-consciousness implies that it is an immutable unit. Man's personality is by Buddha conceived as a compound, which as such is subject to the law of dissolution. While the existence of an *âtman* in the technical sense of the Brahman psychology is openly and squarely disavowed, the word *âtman* is nevertheless used in the common significance of "self." Thus we meet in the *Dharma-pada* with such passages as this: "Self is the Lord? Who else should be Lord?" (verse 160), and "a man who controls himself enters the untrodden land through his own self-controlled self" (verse 323). But this "self" is the conscious condition that is expressed in the words "I will," and not the eternal *âtman* of the Brahman sages, it means "self" as we use the word in common parlance.

The truth is reiterated that all things in this world are compounds, and compounds are subject to the law of dissolution. There is an absolute non-existence of an *âtman*, of a stable, immutable, soul-substance, and thus Buddhism naturally appears at first sight as nihilistic. It seems to deny all that which according to the usual conception of the soul seems to be of value, and we may wonder why Buddhism appeared acceptable to anybody. Here lies the difficulty of comprehending Buddhism, and even some of its best expounders have failed to understand it properly. Men like Oldenberg look upon Buddhism as an ill-concealed negativism, and when the Buddha refuses to answer certain questions, such as whether the saint will live on after death or be annihilated, Oldenberg believes that the Buddha shirks an answer because he fears to shock the weak-minded hearer who would not be able to stand the full truth which clearly pointed to the reply that a saint would be annihilated after death. Mr. Warren here sees deeper than Oldenberg. Mr. Warren declares in his introductory discourse to Chapter II. that all the questions which Buddha left unanswered touch problems which according to his doctrines were out of court, "for these questions take for granted what he denies, 'hence he refuses to give a Yes or No answer, just as any one of us might be excused for doing, in case any one were to be so impolite as to ask 'Have you left off beating your mother?' The truth of no one of these theories could be allowed. 'They are one and all heretical and incompatible with his doctrine.'"

Most palpable is this in a chapter taken from the *Digha-Nikaya*, § 67. pp. 310-311. Here a certain priest wants the question answered, "Where do these four elements, to-wit, the earthy element, the watery element, the fiery element, and the windy element, utterly cease?" He addresses all the sages, kings, and gods, until at last he comes to Brahma himself, and Brahma spoke to the priest as follows: "I, O priest, am Brahma, Great Brahma, the Supreme Being, the Unsurpassed, the Perceiver of All Things, the Controller, the Lord of All, the Maker, the Fashioner, the Chief, the Victor, the Ruler, the Father of All Beings Who Have Been and Are to Be."

The questioner not without a tinge of irony objects to this, saying: "My friend, I am not asking you, are you Brahma, Great Brahma, the Supreme Being, etc.? but I ask you 'Where do these four elements utterly cease?'" Brahma repeats his

self-glorifying speech three times, and then he takes the questioner by the arm, leads him aside, and speaks to him as follows :

"O priest, these gods of my suite believe as follows : 'Brahma sees all things ; knows all things ; has penetrated all things.' Therefore was it that I did not answer you in their presence. I, O priest, do not know where these four elements, to-wit, the earthy element, the watery element, the fiery element, and the windy element utterly cease. Therefore it was a sin and a crime, O priest, that you left the Blessed One, and went elsewhere in quest of an answer to this question. Turn back, O priest, and having drawn near to the Blessed One, ask him this question, and as the Blessed One shall explain unto you, so believe."

When the priest appears before the Blessed One, the latter says after some introductory remarks : "O priest, this question ought never to have been put thus, 'Reverend Sir, where do these four elements, to-wit, the earthy element, the watery element, the fiery element, and the windy element utterly cease?' But this, O priest, is how the question should have been put :

"O where doth water, where doth earth,
And fire, and wind no footing find ?
And where doth long, and where doth short
And fine and coarse and good and bad,
And where do name and form both cease,
And turn to utter nothingness ?

"And the answer is :

"In consciousness invisible
And infinite, of radiance bright,
O there doth water, there doth earth,
And fire and wind no footing find.
And there doth long, and there doth short,
And fine and coarse and good and bad,
And there do name and form both cease
And utter nothingness become.
And then, when consciousness hath ceased,
This all hath turned to nothingness."

Here Buddha directly states that the question "ought never to have been put thus," which means that the problem is wrongly formulated. The four elements do not utterly cease, but they only do not find a footing in him who has surrendered all attachment, who is free from desire, who has attained nirvâna.

The standpoint which Buddha assumes is so radically different from the standpoint of the Brahmins that their most important problems become irrelevant. The âtman does not exist, and therefore the attainment of nirvâna, consisting in the getting rid of illusion, is not an annihilation, for there is nothing to be annihilated. The reality of the world remains real as before. The first fault is that man thinks

of himself as an individual *âtman* which produces the fear of annihilation in death. The question whether man's self, his *âtman*, is annihilated in death or preserved, has no sense.

Buddha denies on the one hand the reality of an immutable being, of the *ὄντως ὄν* or Absolute Being such as it was conceived by the Eleatics, and on the other hand he denies the illusoriness of our experience and our deeds. Buddha is not an idealist in the sense that existence should be regarded as a sham. Avoiding the two extremes, he calls his doctrine the "middle doctrine."

But what is the reality that according to Buddha is real? Reality according to Buddha consists in the processes that are taking place, and the reality of living beings consists in their deeds. Reality is doing or acting, as the Germans call it *wirken*. Reality is *Wirklichkeit*. Buddha's doctrine is a strict monism. He does not divide the world into a creator and a creation, a doer and deeds, an enjoyer and enjoyment. Doing exists and the doer is a name given to the doing, as constituted by the groups of existence. There is *karma* but no *âtman*. Thus the world as it exists is a system of actions that are taking place, and every living being is the exact result of its own karma. The evil as well as the good is our own making, and of course every individual must be regarded as the present incorporation of a long history. It is the result of a development in previous lives. Individuals in the proper sense of the word, accordingly, do not exist. The individual as we conceive it is only a temporary incarnation of its own life-history, and it is this doctrine of deeds, or karma, which makes Buddhism so much akin to the theory of evolution.

The term "karma" has two meanings: first, it means deed, that is to say, the performance of definite actions, and then, the character which is constituted through deeds. Deeds leave traces and establish habits by repetition. They constitute what we call character, and while there is no *âtman* which transmigrates from one individual to another, there is a rebirth of character. The same characters appear again and again and perpetuate the species. In this way they constitute a conception which is not unlike the Christian idea of immortality. Mr. Warren says (p. 210): "It is the character of our friend, his particular set of deeds, or karma, 'that we think of as surviving death, and this is exactly what the Buddhists do,—' the only difference being that we claim the existence of an ego. . . . The reader 'will see, I think, that the two doctrines are really very similar, if we but leave the 'postulation of an ego out of the question.'"

After these expositions we can explain what the Buddha regarded as the essence of our own being. Man has no right to call anything his own that he will lose again, not his property, not his family, not his slaves, not even his own body, and the present manifestations of his consciousness. His own consists in his karma, in the deeds which he performs, for they survive after death. This doctrine finds expression in the following verses:

"Nor grain, nor wealth, nor store of gold and silver,
Not one amongst his women-folk and children,

Nor slave, domestic, hired man,
 Nor any one that eats his bread,
 Can follow him who leaves this life,
 But all things must be left behind.

"But every deed a man performs,
 With body, or with voice, or mind,
 'Tis this that he can call his own,
 This with him take as he goes hence.
 This is what follows after him,
 And like a shadow ne'er departs.

"Let all, then, noble deeds perform,
 A treasure-store for future weal ;
 For merit gained this life within,
 Will yield a blessing in the next."

Buddha's doctrine is, in one word, anti-metaphysical. He denies the thing-in-itself, the *âtman*, the eternal, as a substance or entity. There is nothing permanent except the eternal truth that can be gained by enlightenment.

While Buddha's system was a definite philosophy which in spite of the many corruptions of the Pâli texts is in its outlines very clearly set forth, we cannot help admiring the practical spirit of the Great Teacher, the influence of which lasted for millenniums and will probably never be obliterated in his followers, even where they have degenerated and are in utter ignorance of the significance of his doctrines. Mr. Warren says of the Buddha in his introductory discourse to the first chapter : "In reading the Pâli Scriptures one is impressed with the strong personal influence exercised by the Buddha over the hearts of his followers. He was regarded not as a mere formulator of dry metaphysical propositions, but as a very wise and compassionate friend of his fellow-men. He was full of tact, and all his ways were ways of peace. To allay discord he would tell a little story or fable with a moral, and his epithet for one of whom he disapproved was merely 'vain man.' Anger, in fact, had no place in his character, and the reader of this book will find that it had equally none in his religio-philosophic system." P. C.

BHAKTI SATAKA. By *Râma Chandrabhârati*. With a Commentary by the *Rev. C. A. Seelakkhandha Thera*. Darjeeling : Buddhist Text Society of India. 1896.

The *Bhakti Sataka*, or "Hundred Lines of Faith," written in the beginning of the thirteenth century A. D. by Sri Râma Chandrabhârati, a pupil of Sri Rahula Sangha Raja, illustrates the virtues of the Buddha. The Rev. C. A. Seelakkhandha, of the Sailabimbarama Vihara at Dodauduwa, Ceylon, has undertaken to edit the *Bhakti Sataka* with a commentary, trusting that on account of its excellent style and the information it contains on Buddhism the poem will prove a very useful Sanskrit Reader for beginners.

The Reverend Seelakkhandha says in the preface :

"As it is my earnest desire to make the *Bhakti Sataka* useful to those who are, at present, only imperfectly acquainted with Buddhism, I have written this commentary called *Ratnamala* to enable them to easily understand the real meaning of the text in accordance with the rules of Buddhism. In many instances, I have quoted from other works on Buddhism. The author, Pandit Rama Chandrabharati, having thoroughly acquainted himself with the tenets of Lord Buddha and also with the accepted interpretation of his doctrine, and having accepted the truth, as it is the duty of every learned man, and also having realised that there is nothing more important than happiness in our next birth, followed the religion of his conviction."

KPS.

THE LITERARY STUDY OF THE BIBLE. An Account of the Leading Forms of Literature Represented in the Sacred Writings. Intended for English Readers. By *Richard G. Moulton, M. A. (Cambr.), Ph. D. (Penna.),* Professor of Literature in English in the University of Chicago. Boston: D. C. Heath & Co. 1895. Pages, 533.

THE MODERN READER'S BIBLE. A Series of Works from the Sacred Scriptures, Presented in Modern Literary Form. Edited, with an Introduction and Notes, by *Richard G. Moulton.* New York: Macmillan & Co. 1896. In small 18 mo. Volumes. Cloth, extra. Price, 50 cents each.

There is no need of the apology which Professor Moulton prefixes to his introductory remarks to the first of these works, touching its being a new increase to the number of books on the Bible. The work which he has attempted is so important, and the fruits which it is likely to bear are so tremendous, that one wonders the task was not attempted in English long before, although of a magnitude that would naturally repel anybody but a trained and indefatigable scholar. His work has been based upon the belief, "that the natural interest of sacred literature is considerably impaired by the form in which the Bible is usually read." The proper arrangement of the printed page, the distinction between prose and verse, the insertion of the names of speakers in dialogue, the assignment of characteristic titles, and the inclusion of a mass of totally diverse kinds of literature higgledy-piggledy in a single volume are matters of convenience and inconvenience which have never been considered in the editing of Bibles, and the lack of which, or the presence of which, has rendered the reading of Scripture if not a positive bore yet highly repellent to all except the most devout and untiring minds. The aversion of the average cultured reader to perusals of Scripture is certainly not based upon its lack of intrinsic interest. No one who has read such glowing and impassioned treatments of the literary prophets as are to be found in books like Cornill's *Prophecies of Israel* can for a moment doubt the importance and fascination of the history and literature of this people. We may go farther than Professor Moulton and say that the fewness of those to whom the Bible appeals as literature is not due in part

but is due almost *entirely* to the forbidding form in which we allow the Bible to be presented to us. "Let the reader imagine the poems of Wordsworth, the plays of "Shakespeare, the essays of Bacon, and the histories of Motley to be bound together in a single volume; let him suppose the titles of the poems and essays cut out, and the names of speakers and divisions of speeches removed, the whole divided up into sentences of a convenient length for parsing, and again into lessons containing a larger or smaller number of these sentences. If the reader can carry his imagination through these processes, he will have before him a fair parallel to the literary form in which the Bible has come to the modern reader."

As the author well says, here is common ground—this literary appreciation of Scripture—upon which the devout believer, the free thinker, the reverent scholar, and even opposing schools of criticism may meet. He has not attempted to embrace in his work all of the wide field denominated the literary study of the Bible, but has devoted most of his research and thought to one single aspect of the subject—the *treatment of literary morphology*: "how to distinguish one literary composition from another, to say exactly where each begins and ends; to recognise Epic, Lyric, "and other forms as they appear in their biblical dress, as well as to distinguish "literary forms special to the Sacred writers." Hence has sprung the sub-title of the book—"An Account of the *Leading Forms of Literature* Represented in the Sacred Writings." The whole thus works up to what the author has called "A Literary Index of the Bible," ranging from Genesis to Revelation, and including the Apocryphal books of Wisdom and Ecclesiasticus. Using this Index, Professor Moulton says: "A student might mark these divisions and titles in the margin of his Revised Version, and so do for his Bible what the printer would do for all literature." The preferable plan, however, would be for the student to use the single volumes of Professor Moulton's *Modern Reader's Bible Series*, where this work has been done upon the actual printed page in excellent letter-press and typography.

Criticism and religious interpretation Professor Moulton leaves aside. For a literary appreciation, say of Deuteronomy, it is a matter of no import, he contends, whether this work was a composition of Moses or whether it was a fiction of the age of Josiah. Indifferent, however, as are the results of the Higher Criticism to a purely literary appreciation of the Bible, it is interesting to note that the literary treatment has often weighty suggestions to offer to the historical treatment. As a characteristic example Professor Moulton chooses a group of verses in the Book of Micah where even a casual reader remarks a sharply contrasted change of tone. Wellhausen sees in this changed tone evidence of a new composition. "Between verse 6 and verse 7," he says, "there yawns a century." "What really yawns between the verses," retorts Professor Moulton, "is simply a change of speakers." On the obvious assumption that the latter part of Micah is dramatic, all, in the Professor's view, is explained.

Another point of difference between the historical and literary treatments has regard to the "genuineness" of compositions. In the Higher Criticism "interpo-

lations" and "accretions" are frequently alluded to as something illegitimate. Professor Moulton rejects this imputation. In floating literature, such as the Hebrew literature largely was, there is no analogue of the modern idea of "originality." "My contention is that, whatever may be the truth as to dates, all the sections of such a poem as *Job* are equally 'genuine.' And as a matter of literary analysis, I find the speeches of Elihu and the Divine Intervention, from whatever sources they may have come, carrying forward the previous movement of the poem to a natural dramatic climax, and in literary effect as striking as any part of the book."

It remains for us to mention one additional point upon which Professor Moulton lays special emphasis—the *place in liberal education* of the Bible as literature. His plea on this head rises to the pitch of eloquence. He condemns the Mediæval narrowness and Renaissance paganism which compels our youth to draw their life's inspiration from the sensuous ideals of Greek and Roman antiquity, while neglecting the grand moral productions of Hebrew thought. "It is surely good that our youth, during the formative period, should have displayed to them in a literary dress as brilliant as that of Greek literature—in lyrics which Pindar cannot surpass, in rhetoric as forcible as that of Demosthenes, or contemplative prose not inferior to Plato's—a people dominated by an utter passion for righteousness, a people whose ideas of purity, of infinite good, of universal order, of faith in the irresistible downfall of all moral evil, moved to a poetic passion as fervid, and speech as musical, as when Sappho sang of love, or Æschylos thundered his deep notes of destiny."

There is no gainsaying the wisdom and appositeness of this plea, and it is commendable that this ethical consideration, aiming at the formation of a nation's habits and thoughts, should in the production of the book have outweighed, or at least counterbalanced, matters of purely æsthetical and literary import. For literature and art are the handmaids, not the objects of life.

The work itself is divided into five "Books," exclusive of Introduction and Appendices. The Introduction takes up the Book of *Job* as a typical example and shows the various kinds of literary interest illustrated by it. It is found to contain specimens of epic, lyric, and dramatic composition, to have a philosophical and scientific interest, an interest of prophecy, and an adscititious interest in respect to rhetoric and versification. These "interests," and others, are then developed and applied in the six Books of the work, which bear respectively the titles: "Literary Classification Applied to the Sacred Scriptures;" "Lyric Poetry of the Bible;" "Biblical History and Epic;" "The Philosophy of the Bible, or Wisdom Literature;" "Biblical Literature of Prophecy;" "The Biblical Literature of Rhetoric." The Appendices are exhaustive and valuable, and give much needful material for the general reader in his study of the literary morphology of the Bible.

On the whole, *The Literary Study of the Bible* forms an excellent companion-book and guide to the little volumes which are issuing in *The Modern Reader's*

Bible Series, published by Macmillan, and arranged and edited by the same author. In this series the following, composing the *Wisdom series*, have already appeared: "The Proverbs;" "Ecclesiasticus;" "Ecclesiastes—Wisdom of Solomon;" and the "Book of Job." Each is provided with a special introduction, table of contents, prologues, epilogues, annotations, etc.,—everything in the style of a modern book. Their handy form, the elegance and taste displayed by both editor and publisher make them unusually attractive volumes.

THOMAS J. MCCORMACK.

THE UNITED STATES OF AMERICA. 1765–1865. By *Edward Channing, Ph. D.*, Assistant Professor of History in Harvard University. Cambridge [England]: University Press. 1896. [Cambridge Historical Series.]

So much has been said of the extent to which present relations between America and England are affected by instructions given in school concerning their old disputes and conflicts, that opportuneness will be at once conceded to the present volume. It is written especially for English readers, and comes with every guarantee of competency and fairness, as well as with the promise of enabling Englishmen to review, from the American standpoint, a century in which the histories of the two nations can hardly at any point be disconnected. The century is happily chosen. The first chapter, of forty pages, is a condensed and valuable prologue in which the colonial conditions and events which prepared the arena and led on to the struggles for nationality, are presented in broad outlines. Between the spring of 1765, when the Stamp-Act was imposed by Parliament, and the spring of 1865, when the restored Union was cemented by the blood of President Lincoln, lies the continuous history of American nationality, and Dr. Channing has shown good workmanship in compressing this century of events in the space of three hundred pages. Of course in that space, determined, no doubt, by editorial exigencies, some salient matters are necessarily omitted; but some suppressions are questionable. The proceedings of Governors Tryon in North Carolina and Dunmore in Virginia in fanning popular rage might at least have been referred to, though less striking than the case of Hutchinson in Massachusetts who was the first to put "independence" into the New England head. In trying to suppress the Tea troubles, he "rashly began an academic discussion as to the rights and duties of the colonists, proving conclusively that the position assumed by the colonists was unsound and that they must either submit or become independent." Dr. Channing regards the Stamp Act as constitutional but inexpedient. He is perhaps a little too tender in passing over the arrogant attitude of the English government towards American petitions, and the gratuitous ungraciousness which accompanied the repeal of the Stamp Act with a Declaratory Act affirming the right "to bind the colonies and people of America, subjects of the crown of Great Britain, in all cases whatsoever." Lord North told George III. that it was this Act, mere waste paper, which hurt the Americans most.

As a rule Dr. Channing avoids more than could be wished the sore points in his story for English readers, but in one instance we find a curious example of the permanence of unhistoric traditions even in seats of learning. Thus, in writing of the surrender of Burgoyne (page 92), he says :

"The Saratoga Convention stipulated that British soldiers should embark on transports to be provided by their government, and should not serve again in North America until exchanged. Weakness or good nature had induced Gates to grant these terms. The convention was not carried out in good faith by either party to it. The public property was not again given up by the British, and a demand for a descriptive list of the prisoners drew from Burgoyne some ill-advised words to the effect that the Convention had been broken by the Americans. These things, trifling in themselves, may be held, in some slight degree, to justify the Continental Congress in its refusal to ratify the Convention. The real reason, however, for that action seems to have been a natural fear on the part of the French government lest the Convention troops should be used against them in Europe. On moral grounds this action of Congress cannot be defended, but legally it was justifiable."

Documents cited in Fonblanque's *Life of Burgoyne* show that Gates's terms were the alternative of a life-and-death struggle; that there was not the slightest departure from good faith on the British side; and the justice of Burgoyne's "ill-advised words" is now justified by an authority which relieves the French of all participation in the matter. This authority is no less than that of Washington himself who, in a letter to the President of Congress (November 26, 1777), reminds him that so soon as the surrendered troops reach England, "the most scrupulous and virtuous observance of the convention will justify the ministry in placing them in garrison, and sending out others to reinforce General Howe." This letter will be found in Ford's "*Writings of Washington*," Vol. VI., page 225, and in the same volume, pages 245-248, 283, 293, 369, may be found further letters and notes of the means by which fulfilment of the convention was avoided.

Dr. Channing is generally careful in his treatment of international points, of later periods, so far as England is concerned, though, he occasionally makes questionable remarks. Thus, with regard to the Ashburton treaty it is said (p. 227): "It appears, however, that had Webster been correctly informed, he need not have yielded as much as he did as to the north-eastern boundary of Maine." The Secretary of State (Webster) had in his desk the red-lined map used by Franklin at the treaty of 1783, which coincided with the boundary claimed by England, and it is doubtful whether he would have got so much had this evidence been known to Lord Ashburton. (*Parl. Debates*, LXVII, 1183.)

The sixty-six pages allotted to the late Civil War are written with fairness to the South, but not always with due recognition of the small wires on which hung great weights, "The 'Horror of Fredericksburg'" (December 13, 1862), says Dr. Channing, "cost the Union army thirteen thousand men," but it might have been

added that the whole army might have been destroyed but for Lee's reluctance to shell the beloved little town, a tenderness which permitted Burnside's army to cross the Rappahannock on pontoons during the night. "The people of the western part of Virginia," says our author, "had no sympathy with secession. They were outvoted in the State Convention by the delegates from the eastern part of the State." But a majority of the eastern delegates were also opposed to secession, and the Virginia Convention was carried for secession solely by President Lincoln's proclamation of April 15, 1861, calling upon the States, Virginia included, for seventy-five thousand militiamen to march against the seven States which had seceded. That demand on the Virginians to march against their Southern brethren came while the State Convention was in session, and turned the Unionist majority into a minority. Had the President's proclamation been delayed a day or two, at most, Virginia would have adhered to the Union, for another Convention was impossible. It is doubtful whether without Virginia the Confederacy could have made much headway, and it is certain that our historian would not have had to record the startling figures that the war, in its two thousand four hundred actions, cost the whole country a million lives, and two thousand million pounds sterling. This may appear a moderate cost for what Dr. Channing regards as the result—settlement of the "two questions of slavery and nationality"; but as he declares the interpretation of the Constitution, as to the right of secession, as "historically uncertain," it seems strange that among the constitutional amendments that have grown out of the war none should affirm the inviolability of the Union.

Dr. Channing's little book is so well written, and in some matters so instructive, that with some revision and amendment in the light of historic justice, it might serve for educational uses. Unfortunately the Professor does not escape from the ruts worn by some of his predecessors, even though their traditional errors have been revealed by recent investigators. Prejudice is apt to be tyrannous in proportion to the importance of the things involved; and in American history especially the most vital questions are connected with certain eminent men on whom the historian's judgment cannot be pronounced uncritically without misleading his readers in matters more important than any individual. A Harvard professor—shall we say a Channing?—might be expected to speak with discrimination even of Tom Paine; but if that were too much to ask, surely he should not write of any historic figure in the following way: "Charles Lee, a renegade Englishman, committed treason many times; and of Horatio Gates, a recent immigrant to Virginia, it is difficult to speak with calmness. He was self-sufficient and cowardly; and he treated his subordinates with a spirit of unfairness and jealousy hardly to be conceived." If Dr. Channing possesses fresh information concerning these men, it should have been here adduced; so far as the facts have been published, it is left doubtful whether Lee was ever disloyal at heart to the American cause, and the charge of cowardice against Gates has never been proved. He did not anticipate his victory at Saratoga, and had prudently prepared means for retreat if necessary,

but we cannot think much would ever have been heard of this, or of Charles Lee's "treason," if the two men had not been accused of slighting Washington. Of Washington Dr. Channing says: "As a man, and as a leader of men, George Washington occupies an unique position among historic personages of ancient and modern times. Other men have been more brilliant than he; but in no other man have considerable abilities been combined with absolute honesty and steadfastness of purpose as they were in him." With such a view of the chieftain it must require exceptional self-restraint not to offer up promptly on his altar any one on whom he frowned, and our author's failures to exercise this self-restraint mar his history at several important points. Thus, he says of the Minister of the French Republic (1793):

"Landing at Charleston, Genet at once began the fitting out of privateers, and seemed disposed to use the soil of the United States as if it were French territory. Jefferson advised him to be moderate in his actions; but Genet not only broke promises he had made to the Secretary of State, but he defied the Government. Washington, after mature deliberation, decided to regard the treaty of 1778 as not binding in this case. . . . Genet then appealed to the people against Washington" (p. 148).

Whether Genet broke any promises to the Secretary of State (Jefferson), or the latter broke his promises to Genet, is a question of veracity between the two men, and as our author describes Jefferson as "a political inventor," and "working in the dark," it would seem that the notoriously frank and undiplomatic Genet might fairly claim his verdict. But as to the alleged appeal of Genet to the people against Washington, it was not charged at the time, but only that he had been heard to threaten that he would do so. This charge was made by John Jay and Rufus King, who were compelled to name Mr. Dallas as the man who heard the threat, and this drew from Dallas a complete denial of their story. The documents were all printed in the *American Historical Register*, November 1866.

Edmund Randolph, on whom the crisis of Washington's presidential career turned, is not even mentioned in Dr. Channing's book!

Another man unfortunate enough to fall under Washington's disapprobation was Monroe, who was the United States Minister in Paris during the excitement there over the British Treaty of 1795. "Instead," says Dr. Channing, "of trying to reconcile the French government to Jay's treaty, he increased the irritation which was felt in France by his petulant and undignified conduct, and returned to the United States in disgrace." On the contrary, Monroe, despite his dislike of the Treaty, had almost brought the French government to tolerate it, and it was his sudden recall that undid his work and brought France and the United States to the verge of war. So far from returning to America in disgrace, Monroe returned to become President of the United States, and our author himself is constrained to say, "Monroe's first administration was in many respects the most successful in

the history of the country," and that "the close of Monroe's (second) administration was in every respect the end of the "Era of Good Feeling."

These lapses are not numerous in Dr. Channing's book, but they are sadly significant. They could not have been made by any writer who had mastered even the published documents recently brought to light concerning Washington, Monroe, Edmund Randolph, Jefferson, Thomas Paine, much less searched into the mass of unpublished documents in our State archives. It is distressing to observe a similar lack of original research in most of the volumes which profess to deal in any compendious way with American history. McMasters, John Fiske, and now Dr. Channing, seem to think that our history can be written within the walls of their respective libraries, and do not appear to be aware that they are dealing summarily with facts, traditions, situations, affecting other countries, and even with the international relations of these countries at the present moment. A similar fault pervades most of the historical works of England and France, which are largely indictments of each other, based on partial investigations. There is great need of a real and thorough work, written by some English or American scholar, narrating with absolute impartiality the international history of America, England, and France, and without any bias of national pride in great names,—such as Washington, Franklin, Jefferson, Hamilton, Burke, Pitt, Fox, Napoleon, or any other conventionalised hero or bogey. These men had their virtues and their faults, and by both history was moulded; and the historian, occupying the House of the Interpreter, should never descend into the arena of the partisan conflicts whose meaning he is to unfold and whose results he is to trace out.

What young and brave student is there in the West who will consecrate himself to the task of giving to America and to Europe a history that exact thinkers and judicial patriots in both hemispheres shall welcome, and which may train the more cosmopolitan generation whose motto will be: "The world is my country, to do good my religion"?

M. D. CONWAY.

GRUNDRISS DER PSYCHOLOGIE. By *Wilhelm Wundt*. Leipsic: Wilhelm Engelmann. 1896, Pages, 392.

The psychological views of Professor Wundt are so well known, and his works on this and cognate branches so widely circulated, that it is unnecessary to speak of the character and tendency of his present concise *Rudiments of Psychology*, which after long solicitations he has at last been induced to give to the world. It will be sufficient to characterise its position with regard to the great psychologist's other works. The purpose of the *Rudiments* has been a twofold one: first, to place into the hands of Professor Wundt's pupils an outline of his oral course in psychology, an end which will meet the needs of nearly all students of the subject, and secondly, to provide for the general reader of culture, who wishes to get some conception of the work in modern psychology, a systematic survey of its most important results and theories. In consequence of this simplicity and limitation of pur-

pose, the exposition has been restricted to the simplest and most important facts, and all explanation of apparatus and experimenting has been omitted. Naturally, Professor Wundt has laid at the foundation of his treatment the views which he himself regards as the best, but he has not omitted to characterise briefly the principal psychological doctrines which diverge from his own.

We have now from Professor Wundt's pen three formal and important works on psychology proper. The first is his celebrated voluminous treatise on the *Elements of Physiological Psychology*, which, if it has not been nominally translated, has yet been partially paraphrased in American text-books. This treatise was devoted to the exposition of the methods for applying the procedures of physical science to the investigation and analysis of psycho-physical facts, and of the results which had been reached by the application of those methods. General considerations, of course, were here forced into the background. The second work is the new edition of his *Lectures on Human and Animal Psychology*, which has been translated into English by Professors Titchener and Creighton, of Cornell. This is a more popular attempt at giving the character and purpose of experimental psychology, but at the same time it includes discussions of more general philosophic import. In other words, the first work laid greatest stress upon the relations of psychology to physiology, the second emphasised principally the philosophical points of view, while the present work or *Rudiments* is devoted to the presentation of psychology in that special orderly form and systematic arrangement which is the outcome of Professor Wundt's experience and judgment on the methodology of the subject. The author himself regards it in this point of view as a helpful supplement to all his previous psychological works and especially to his formal views, as stated in the section entitled "The Logic of Psychology," in the second volume of the second part of the second edition of his *Logic*.

The treatment itself falls under four heads exclusive of the Introduction, where the problems, theories, and methods of psychology are discussed. The first head is called "Psychical Elements," where simple sensations and feelings are considered. The second is called "Psychical Compounds" (*Gebilde*), where the subjects of intensive and spatial percepts, temporal, visual, and auditive percepts, composite feelings, emotions, and volitions are discussed. The third bears the title of the "Relations between the Psychical Compounds," and treats of consciousness and attention, association, memory, apperceptive combinations, psychical states, etc. The fourth is entitled "Products of Psychical Evolution." Here are emphasised the psychical attributes of animals, the psychical evolution of the child, the evolution of intellectual communities, embracing language, mythology, and customs. The last and fifth head bears the title of "Psychical Causality and its Laws." The notion of the soul, the psychological laws of relation, and the psychological laws of evolution are here dwelt upon. The whole comprises about 384 pages, making the exposition, thus, a model of conciseness, as it is also with respect to the richness and importance of the material offered. μрк.

ON MEMORY, AND THE SPECIFIC ENERGIES OF THE NERVOUS SYSTEM. By *Prof. Ewald Hering*. Chicago: The Open Court Publishing Co. Pages, 50. Price, 15 cents.

Students have now accessible in a cheap form both the classical memoir of Hering "On Memory," and his equally well-known article on "The Specific Energies of the Nervous System." Hering has rarely unbent himself to popular and untechnical expression; in fact, with the exception of these two essays, we know of hardly another case of his having done so in all his published works. But he is certainly a master in the art of giving abstruse results in concise and simple form. More of such work would have been a boon to the semi-scientific world, and it is safe to say that much of his high reputation, even among inquirers, or at least among such as have not worked in just his specialty, is due to the success of the essays comprised in this little book. ω.

L'ANNÉE PSYCHOLOGIQUE. Publiée par MM. H. Beaunis et A. Binet. Paris: Félix Alcan. 1896. Pages, 1010. Price, 15 fr.

The Messrs. Beaunis and Binet are to be congratulated upon the success of the undertaking born into life in this portly volume. The *Année Psychologique* counts among its collaborators Professor Ribot of the Collège de France, M. Victor Henri, now engaged in the Laboratory of Wundt, at Leipsic, MM. Azoulay, Biervliet, Bourdon, Chaslin Courtier, Flournoy, Forel, Gley, Passy, Philippe, Xilliez, and Mlle. Sczawinska. The laudable purpose of the *Année* has been (1) to present a series of original and representative memoirs by leading psychologists; (2) to present an account of the work done in the Laboratory of Physiological Psychology at Paris; (3) to present general systematic synopses of the work done in certain extremely special departments of psychological research and thought, the choice of which seems largely dictated by the taste of the collaborators; (4) analytical notices of the main works which have appeared in psychology and cognate subjects; (5) and lastly, a biographical index of everything which has appeared upon psychology or upon any subject relating to psychology during the entire preceding year (1895). This last list includes 1394 titles. The original memoirs are by (1) Ribot, "Abnormal Morbid Characters;" (2) Forel, "Bird's-eye View of Comparative Psychology;" (3) Flournoy, "On Time of Reading and Omission;" (4) Bourdon, "On Intellectual Phenomena;" (5) Gley, "On Conditions Favoring Hypnosis;" (6) Biervliet, "Illusions of Weight." In the accounts of special departments of research we have an article by Azoulay, who is something of a spelling-reformer, on "Histological Psychology;" an article by V. Henri on "The Space-Sense of the Skin;" by J. Passy, on "Olfactive Sensations;" by A. Binet and V. Henri, on "Individual Psychology," and lastly, one by V. Henri, on "The Calculation of Probabilities in Psychology."

The labor involved in the compilation of this large work has been enormous and its convenience will be appreciated by all students of psychology. Annual sub-

scriptions to the *Année Psychologique* costs for foreign countries 15 francs, and may be addressed to M. Binet, at the Sorbonne, Paris. μ.

THE PSYCHOLOGICAL INDEX, No. 2. A Bibliography of the Literature of Psychology and Cognate Subjects for 1895. Compiled by *Livingston Farrand*, Columbia College, and *Howard C. Warren*, Princeton University. New York and London: Macmillan & Co. Price, 75 cents.

PRINCETON CONTRIBUTIONS TO PSYCHOLOGY. Reprinted from the *Psychological Review*. Edited by *J. Mark Baldwin*. Princeton: The University Press. January, 1896. Pages, 49. Price, 50 cents.

The number of titles of the various books, pamphlets, articles, and utterances connected in any way with the subject of psychology for the year 1895, amounts, according to this issue of *The Psychological Index*, to 1394. This number agrees with that given in the bibliographical table of the *Année Psychologique* of MM. Beaunis and Binet. The two lists appear in fact to be identical, and were no doubt compiled in concert. It was certainly a deserving task, and that issued by the *Psychological Review* is in excellent typographical form.

The second brochure listed above is No. 3 of the *Princeton Contributions to Psychology*, being a reprint from the *Psychological Review*. It contains three articles: I. "The Perception of two Points not the Space-Threshold," by Guy Tawney; II. "The Origin of a Thing and its Nature," by J. Mark Baldwin; III. "Something More About the 'Prospective Reference' of Mind," by W. M. Urban. The *Contributions* are to appear semi-annually.

In the same group we may mention a paper on *Association* (56 pp.), by Mary Whiton Calkins, which appears as a monograph supplement to *The Psychological Review*. μ.

STUDIES FROM THE YALE PSYCHOLOGICAL LABORATORY. Edited by *Edward W. Scripture*, Ph. D. Vol. III. New Haven, Conn.: Yale University. 1895. Pages, 109. Price, \$1.00.

The *Studies* for 1895 open with a long article on "Measurements of Illusions and Hallucinations in Normal Life," by C. E. Seashore. This is followed by some "Studies of Fatigue" by John M. Moore, and by "Some Experiments on the Reaction-Time of a Dog" by Edward M. Weyer. It closes with a description of "Some New Apparatus" by E. W. Scripture. μμ.

AN EXAMINATION OF WEISMANNISM. By *George John Romanes*, F. R. S. Chicago: The Open Court Publishing Co. 1896. Pages, 221. Price, 35 cents.

This is one of the latest additions to the Religion of Science Library. It is printed upon the same paper as the cloth edition and also contains a fine photogravure portrait of Weismann as its frontispiece. Romanes's *Examination of Weismannism* was to have formed part of his work *Darwin, and After Darwin*, but

as his criticism grew under his hands he determined to publish his *Examination* separately. He has considered only the theories which Weismann has reared upon the fundamental postulate of the non-inheritance of acquired characters having reserved for Part II. of his *Darwin, and After Darwin*, which has since appeared, the question of the validity of that postulate itself. The glossary of technical terms is a helpful addition to the work. ω.

STUDIES IN THE PSYCHOLOGY OF RELIGIOUS PHENOMENA: The Religious Motive, Conversion, Facts, and Doctrines. By *James H. Leuba*, Fellow in Psychology at Clark University. Worcester, Mass. 1896. Pages, 76.

Consonantly with the practical trend of modern research, which has also affected psychology, Mr. Leuba proposes here to take up the manifestations of religious life which have hitherto been ignored. He says: "If religion has any 'reality, it must perforce express itself in psychic and physiological phenomena. 'The work of a true Science of Religion, as we understand it, is to find out what 'these subjective manifestations are, and then to treat them as it would any other 'psychic fact.'" His method has been the presentation of extracts from well-known religious documents, in the light of which he analyses such states of mind and body as conversion, surrender, justification, faith, etc. The present pamphlet, which is mainly concerned with psychic facts, is to be followed by a concluding essay which will be chiefly theoretical and speculative, and will point out the possible physiological correlates of the phenomena here considered. μ.

ENDOKANNIBALISMUS. By *Dr. Rudolf S. Steinmetz*. Wien: Anthropologische Gesellschaft. 1896. Pages, 60.

This brochure is an extract from the Proceedings of the Anthropological Society of Vienna and will be interesting to ethnologists who are occupied with the study of anthropology. By endocannibalism is understood the practice of eating members of one's own race as distinguished from members of another. The study of cannibalism generally suffers from the drawback that there are few ethnologists who are personally desirous of investigating the facts. Long sojourns among anthropophagi are attended with dangers which few are willing to risk.

DIE DENKSCHÖPFUNG UMGEBENDER WELT AUS KOSMOGONISCHEN VORSTELLUNGEN IN CULTUR UND UNCULTUR. By *A. Bastian*. Berlin: Ferd. Dümmler. 1896.

Dr. Bastian's works follow one another in rapid succession and in undiminishing bulk, so that we have constant occasion to wonder at the inexhaustible resources of his erudition and world-wide experience. The present book is a comparative survey of the cosmogonic conceptions of civilised and uncivilised people. The discussion embraces almost every possible aspect of the world's thought on creation, and on everything relating to creation: it would be impossible to suggest a subject in this connexion that has not been broached. As we have had occasion to remark

before of Dr. Bastian's other works, this book, too, is in absolute want of an analytical index. Several plates and tables are appended. μ .

DIE LEHRE VON DEN SPEZIFISCHEN SINNESENERGIEN. By *Dr. Rudolf Weinmann*. Hamburg and Leipsic : Leopold Voss. 1895. Pages, 96. Price, M. 2.50.
WIRKLICHKEITSSTANDPUNKT. Eine erkenntnistheoretische Skizze. By *Dr. Rudolf Weinmann*. Hamburg and Leipsic : Leopold Voss. 1896. Pages, 37. Price, M. 0.80.

The work of Dr. Weinmann is an attempt at a historical, systematic, and critical exposition of the doctrine of the specific energies of the nervous system. He has divided his booklet into three parts, the first giving in general outlines the origin and history of the idea of the specific energies, the second a systematic critical statement of the principle, and the third an epistemological discussion of its scope and import. The author pretends to advance no new facts regarding the nature of the specific energies as such ; he believes, however, that they require explanation, being by their very nature a renunciation of explanation ; and finally, it is his opinion that the doctrine has merely a physiological interest, being entirely bereft of epistemological import. We may refer our readers who are not acquainted with German, and who wish to obtain a clear notion of what the specific energies mean, to the admirably clear exposition of Prof. Ewald Hering which was recently published in the *Religion of Science Library*.

In the second pamphlet Dr. Weinmann discusses certain epistemological problems in the light of a criticism of Kant's subjective realism. μ .

ERRATUM.

On page 322 of the April, 1896, *Monist*, line 10 from the bottom (article, Mach's *Stereoscopic Application of Röntgen's Rays*), "by the intermediation of photography" should read "*without* the intermediation of photography."

It was the object of the experiment proposed by Professor Mach, not to use photography, but to do away with photography. In the meantime, a stereoscopic picture of a human hand, with the bones, and with colored liquid injections in the blood-vessels, has, at the suggestion of Professor Mach, been taken by Professor Pfandler of the University of Graz.

PERIODICALS.

THE PSYCHOLOGICAL REVIEW. VOL. III. No. 3.

STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF THE UNIVERSITY OF CHICAGO. (I.) Reaction-Time; A Study in Attention and Habit: *James Rowland Angell* and *Addison W. Moore*. (II.) A Study of Visual and Aural Memory Processes: *Lewis Grant Whitehead*.—STUDIES FROM THE HARVARD PSYCHOLOGICAL LABORATORY. (V.) The Æsthetics of Simple Forms: *Edgar Pierce*. A New Perimeter: *James E. Lough*.—THE ACCURACY OF RECOLLECTION AND OBSERVATION. By *Frederick E. Bolton*.—DISCUSSION, ETC.—(New York: Macmillan & Co., 66 Fifth Avenue.)

THE AMERICAN JOURNAL OF PSYCHOLOGY. Vol. VII. No. 3.

A STUDY IN THE PSYCHOLOGY OF RELIGIOUS PHENOMENA. By *James H. Leuba*.—COLOR-SATURATION AND ITS QUANTITATIVE RELATIONS, By *August Kirschmann, Ph. D.*—MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF WELLESLEY COLLEGE.—A STUDY OF DREAM CONSCIOUSNESS. By *Sarah C. Weed, Florence M. Hallam, and Emma D. Phinney*.—A LABORATORY COURSE IN PHYSIOLOGICAL PSYCHOLOGY, VI. By *Edmund C. Sanford*.—PSYCHOLOGICAL LITERATURE.—NOTES.—(Worcester, Mass.: J. H. Orpha.)

THE PHILOSOPHICAL REVIEW. Vol. V. No. 3.

LOTZE'S MONISM. By *F. C. S. Schiller*.—THE CATEGORY OF SUBSTANCE. By *Prof. Walter Smith*.—SOME ASPECTS OF HEGEL'S PHILOSOPHY. By *Prof. Hiralal Halldar*.—THE LIMITATIONS OF THE INTROSPECTIVE METHOD IN ETHICS. By *Dr. Frank C. Sharp*.—BOOK REVIEWS, ETC.—(Boston, New York, Chicago: Ginn & Co.)

MIND. NEW SERIES, No. 18.

THE CONCEPTION OF IMMORTALITY IN SPINOZA'S *Ethics*. By *A. E. Taylor*.—PLATO'S EARLIER THEORY OF IDEAS. By *R. P. Hardie*.—SENSE, MEANING, AND INTERPRETATION. (II.) By *V. Welby*.—CHARACTER AND THE EMOTIONS. By *Alexander F. Shand*.—DISCUSSIONS, ETC.—(London and Edinburgh: Williams & Norgate.)

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The universality of Kant's mind, his continued ascendancy in the intellectual world, and the recent reversion of philosophical thought to his point of view, gave rise to a plan which Dr. Vaihinger of Halle has long cherished and now finally realised in the publication of a periodical devoted to the investigation of all the phases of Kant's life and activity. The *Kantstudien* will appear irregularly and cost 12 Marks per volume. It is to be similar in its aims to the type of journals devoted to the study of Shakespeare, Goethe, etc. The collaborators are E. Adickes, E. Boutroux, Edw. Caird, C. Cantoni, J. E. Creighton, W. Dilthey, B. Erdmann, K. Fischer, M. Heinze, R. Reicke, A. Riehl, W. Windelband, and others. Prospectus and specimen copy will be sent on applying to Leopold Voss, Hamburg.

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